Keeping Your Facilities SAFE

A Support Document for Industrial Arts Teachers

Manitoba
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KEEPING YOUR FACILITIES
SAFE

A Support Document for
Industrial Arts Teachers

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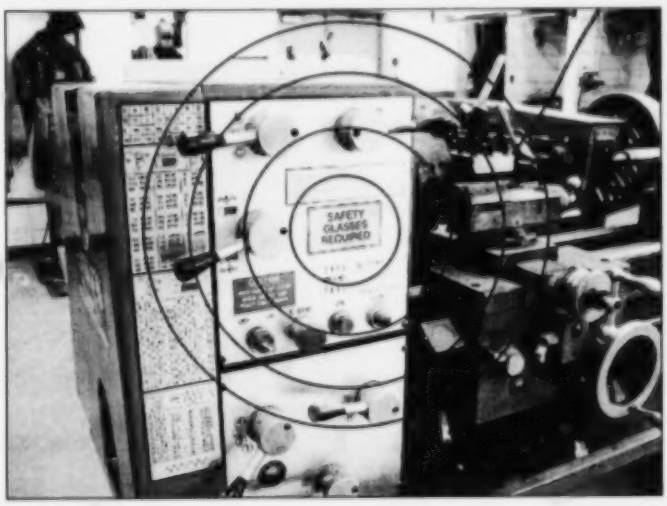
INTRODUCTION

In Manitoba there are over 150 industrial arts facilities. A typical facility may host 150 different students per week, and some facilities may host four different types of programs. Even with such large numbers of students in our systems, incidents in these facilities remain very minimal. It is only through the concern and efforts for safety made by the industrial arts teachers of Manitoba that we are able to boast of this fine record.

Purpose of this Document

This document was developed with the following goals in mind:

- Provide an understanding of the importance of the teacher's role in developing and instilling a safe attitude in students that will carry on from school into their working years.
- Provide information for teachers in the task of facility inspections, machine guarding, and personal protective equipment (PPE).
- Provide resource material that may be used directly within the facility.
- Realization for the need of support and sufficient funds to provide efficient safety and health programs.



Notes

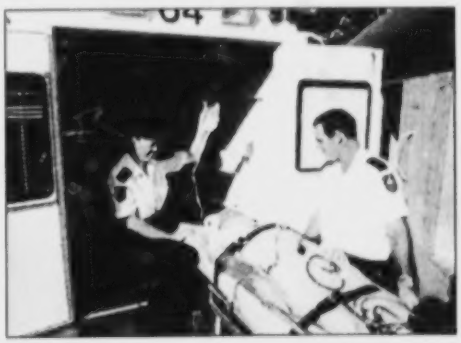
1. IMPORTANCE OF A SAFETY AND HEALTH PROGRAM

Why Have a Safety and Health Program?

- A good industrial arts safety and health program can reduce incidents, injuries, and illness.
- A good program demonstrates the school's commitment to leadership and to protecting the safety and health of staff and students.
- A good program provides both an internal and external motivation to continuously improve.
- A good program allows you to determine the roles and responsibilities for the components of your school's safety and health program.

In Manitoba

- More than 50 percent of work-related incidents happen during a young worker's first six months on the job.
- Males under 25 years of age are much more likely to be injured on the job than any other group of workers.
- People aged 14–24 make up over 15 percent of the population. Many of them have jobs, whether they are full- or part-time.
- In 2001, 54 percent of Manitoba students aged 15–24 were employed, compared to 44 percent of Canadian students. This was the highest student employment rate among provinces.
- Young workers run a greater risk of being injured in the workplace than other age groups. Workers aged 20–24 experienced 14 percent of time-loss injuries from 1993–2000 although they only made up 10 percent of the workforce.



In 2001 in Manitoba:

- Two young workers were killed on the job (they were 16 and 19 years old).
- Every hour, at least one young worker was injured in a workplace incident.
- Almost 7000 young workers had an injury serious enough to file a claim with the Workers Compensation Board.

What is the Internal Responsibility System for Safety and Health?

The Workplace Safety and Health Act supports every worker's right to a safe and healthy workplace. The duty for creating and maintaining a safe and healthy workplace falls on every person in the workplace to the degree that they have the authority and ability to do so. Whether they are the Superintendent or the newest teacher hired, everyone has a personal and shared responsibility for working together co-operatively to prevent workplace injuries and illness.

Because employers have the greatest degree of control over the workplace, they also have the greatest degree of legal responsibility for safety and health. This, however, does not relieve principals and teachers from their duty to participate and co-operate in controlling workplace hazards and to take the necessary precautions to protect themselves and others from hazards.

The Act also recognizes that only workers who are adequately informed and empowered can effectively fulfill their responsibilities. It grants three important rights to workers:

Three Rights

Right to Know

Right to Participate

Right to Refuse

- **The Right to Know** about workplace hazards including how to identify hazards and protect themselves from those hazards, and about the rights afforded to workers under the Act.
- **The Right to Participate** in decisions related to workplace safety and health, free of reprisal for their participation. Participation, in part, is achieved through the committee or workers' representative.
- **The Right to Refuse** work that the worker believes to be dangerous to him/herself or the safety of others.

The Act protects the rights by prohibiting employers from imposing discipline or other sanctions on workers for fulfilling their responsibilities or exercising their rights. This helps workers participate with employers and supervisors in preventing workplace injuries and illness.

Taken together, these components are often called the internal responsibility system (IRS) for workplace safety and health, but good safety and health cannot rely on the internal responsibility system alone. Ongoing monitoring and enforcement by the Workplace Safety and Health Division are also required.

The combination of internal monitoring by Workplace Safety and Health Committees and external monitoring and enforcement by the Workplace Safety and Health Division ensure better legislative compliance and a more effective internal responsibility system in the workplace.

What is Due Diligence?

Sections 5, 6, and 7 of the Act set out due diligence responsibilities. The Act is available at: <http://www.gov.mb.ca/labour/safety>.

Due diligence means everyone with responsibility for safety and health must "....take every precaution reasonable in the circumstances to avoid a work related injury or illness." This concept of "reasonable care" holds individuals accountable for their acts (what they do) and omissions (what they fail to do). It goes beyond simple "regulatory compliance."

Due diligence contains these concepts:

- **Reasonably practicable**: What is "reasonably practicable" is determined by asking what a reasonable person, in the same position and circumstance, would have done to prevent the incident. When making that determination, three main factors need to be taken into account:
  - — foreseeability
  - — preventability
  - — control
- **Degree of risk:** The approach selected to carry out a task depends on the degree of risk. The higher the risk the greater the safety measures that must be taken.

In the case of a workplace safety and health program, the criteria for due diligence requires employers to:

- **Establish a program:** The program should systematically identify hazards and assess their risks. It must include plans within the program to manage those risks. The plans should reduce the likelihood of the identified hazards causing harm.
- **Ensure the program is adequate:** The program must meet the needs of the workplace and the workers. It is a good idea to compare your program with industry standards.
- **Monitor and evaluate the program's effectiveness:** Competent staff must be able to regularly check the effectiveness of the program and judge how well it meets legislative requirements.

Understanding Negligence and Liability

Below is a segment from the *Administration Handbook* (March 2000), which includes a three-page section of reference on negligence and liability.

> It is generally assumed, in law, that teachers and others placed in charge of students have a duty to be responsible for the safety and welfare of those students during school hours and also after school hours during any school-sponsored activities on or off school premises. Failure to act reasonably under the circumstances, if this failure causes injury or death to a student, can result in a possible action in negligence.
>
> It is generally recognized that four conditions must exist for a negligence suit to be successful:
>
> 1. The person alleged to be negligent must have a legal duty to maintain a standard of conduct that will protect others against hazards.
> 2. This person must fail to conform to a reasonable standard of conduct in connection with this duty. (The accepted standard is that of a prudent parent of a large family. However at least one recent court decision made a clear departure from that standard, and adopted a higher "professional" standard of care where a teacher needs specialized knowledge, training and/or experience in order to carry out his/her duties, such as gymnastics instruction in a high school setting).
>
> *(continued)*

3. The person or persons to whom this obligation is owed must suffer a genuine loss or injury (which could be property loss or damage, or physical or psychological injury, or death).
4. There must be a definite casual connection between the first person's failure to maintain a proper standard of conduct and the loss or injury suffered by the second person.

Where teachers and other school officials are concerned, there is little difficulty in proving that a duty of care is owed to students. In any school activity, school personnel are generally assumed to be responsible, within responsible limits, for the welfare of students.

The fact that a mishap takes place does not automatically mean that there has been negligence. Genuine accidents do take place, and while they are unfortunate, no one can be blamed for them. Only if a court decides that a reasonably prudent person in the teacher's situation would have anticipated the mishap and would have acted to prevent it might the teacher be found negligent.

If students are to be placed in situations where the potential for injury exists, appropriate skill training and safety briefing must take place, and safety regulations conscientiously enforced. In addition, school officials are legally obligated to see that any facilities and equipment used are in safe condition.

General Outcomes

The purpose of this safety and health document is to help teachers develop and operate a program that will prevent and control incidents. Such a program will protect students and increase the effectiveness of instructional methods and facility operations.

It is also the goal of this document to provide our students and future workers with the skills, knowledge, and attitudes needed to keep them free and safe from injury now and later on the job.

Safety awareness must occur at:

- school
- home
- social setting
- workplace

The skills acquired through an effective program can be transferred to their daily activities and personal choices. Positive attitudes must be developed through education beginning at a young age and reinforced throughout daily activities and teachings. For safety and health education to be effective it is important that it be viewed as an ongoing partnership among the school, home, community, and workplace, focussing on the following:

- lessen the risk of injuries.
- evaluate potentially dangerous situations and be innovative in safely dealing with such concerns.
- understand safety and health as an integral part of life.
- practise sound decision-making and preventative techniques.

- demonstrate critical thinking and problem-solving skills that will allow them to solve health and safety problems.
- recognize risks and hazards.
- recognize and respond appropriately to emergency situations.
- possess the knowledge, confidence, and initiative that will enable them to recognize and change behaviours and practices in their work environment.
- ability to influence and communicate effectively with colleagues and employers in working together to maintain a healthy and injury-free work environment.
- recognize safety and health warning signs and symbols (e.g., WHMIS).

The elimination or reduction of incidents should be of primary concern to everyone in the school. A formal safety and health program will provide a means for teachers and students to accomplish safety and health objectives.

Establishing Program Outcomes

Establishing outcomes and policy to guide the program's development is critical to the design and organization of a safety and health program. The first step is to establish the following:

1. gaining and maintaining support for the program.
2. motivating, educating, and training those involved in the program to recognize and correct or report hazards located in the labs/facilities.
3. incorporating hazard control into the design.
4. providing a program of inspection and maintenance for machinery, equipment, tools, and facilities.
5. incorporating hazard control into school teaching and educational techniques and methods.
6. complying with established safety and health standards.

Policy Statement

Once the objectives have been formulated, the second step is establishing the policy statement with the active participation of all those involved in the program's operation. The policy statement should reflect:

1. The importance the teacher places on the health and well being of his/her students.
2. The emphasis the school places on efficient operations with a minimum of incidents and losses.
3. The intention of integrating hazard control.
4. The necessity for active leadership, direct participation, and support of the entire school organization.
5. The intent of the school administration to bring its facilities, operations, machinery, equipment, tools, et cetera, within the compliance of health and safety standards and regulations.

The Need for Adequate Budget

There can be no compromise when it comes to the safety of our children. School administrators, in collaboration with their teachers and Safety and Health Committees, should define their safety and health program needs and allocate a sufficient level of resources to meet those needs, along with those allocations traditionally associated with the training and education process.

Responsibilities for the Safety and Health Program

Responsibility for the safety and health program can be established at the following levels:

1. School administration
2. Safety and Health Committees
3. Teachers
4. Students
5. Parents

Responsibilities of School Administration

Before any safety and health program gets underway, it is essential that such a program receive support and commitment from school administration. The school board, superintendent, principal, and others concerned with administration and supervision must accept full responsibility for the safety and health program as it is established, furnish the drive to get the program started, and oversee its operations. Their responsibility is the continuing obligation to carry out an effective safety and health program.

Furthermore, principals and supervisors must invite discussion with teachers and others in the program during pre-planning meetings and periodically throughout the school year. Such discussions may deal with program progress, specific needs, and a review of school safety and health procedures and alternatives for handling emergencies in the event of an incident. Specifically, responsibility at this level is to:

- set objectives and policy.
- ensure that the necessary information, facilities, tools, and equipment are available to conduct a safe program.
- ensure sufficient funds are available for an effective safety budget.
- promote and support professional development regarding safety initiatives in industrial arts.

In consultation with the Safety and Health Committee, school administration must provide meaningful criteria to measure the success of the safety and health program and to provide information upon which to base future decisions.

Responsibilities of Teachers

Teachers have a professional responsibility to safeguard and educate those who have been placed under their supervision. Jointly with school administration, teachers are responsible for creating a safe and healthy instructional setting integrating hazard identification, assessing the risks, and controlling the situation in all aspects of the facility.

For all practical purposes, the teachers are the eyes and ears of the facility control system. On a day-to-day basis, teachers must be aware of what is happening in their facilities, who is doing it, how various tasks are being performed, and under what conditions. They must be ready to change part of an operation or the entire operation if they perceive the immediate need for corrective action.

The primary safety and health responsibilities of teachers are:

- To demonstrate and model safe work procedures.
- To train and educate students in safe work methods and practices.
- To demonstrate an active interest and comply with school safety and health policies and regulations.
- To actively participate in and support the School Safety and Health Committees.
- To supervise and evaluate student performance with consideration given to safe behaviour and work methods.
- To monitor the facility on a daily basis for human, situational, and environmental factors capable of causing incidents.
- To correct hazards detected while monitoring or to report such hazards to the persons who can take corrective action.
- To investigate all incidents occurring within their labs/facilities to determine the cause.
- To ensure that hazard recognition and control information is included in each instructional module and administration session.
- To develop a positive student safety attitude for school, home, social settings, and workplace activities.

Responsibilities of Students

The students constitute the largest segment of the school population and are responsible for making good safety and health decisions. Students who actively participate in the safety program help in preventing injury and equipment damage.

Student responsibilities are:

- To follow school safety and health rules and regulations and work according to standard facility practices.
- To interpret and demonstrate to the satisfaction of the teacher all safe operating procedures regarding materials, tools, mechanical, and personal safety.
- To practise safe work procedures through modelling.
- To recognize and report to the teacher, hazardous conditions, or work practices.
- To use PPE and safety equipment, tools, and machinery as they were designed.
- To report all injuries or exposure to toxic material to the teacher.

Responsibilities of Maintenance

Those involved with maintenance of equipment, machinery, and facilities play an important role in reducing incidents in the school lab/facility. Some of their responsibilities are:

- To provide planned preventative maintenance on electric systems, machinery, and equipment to prevent abnormal deterioration, loss of services, or safety and health hazards.
- To provide for the timely collection and disposal of scrap materials and waste.

The Role of the Workplace Safety and Health Committee

The role of the committee must not be confused with the responsibilities of principals or teachers. The committee brings together workers' in-depth practical knowledge of specific jobs and administrator knowledge of the organization's 'big picture' to provide input and advice on safety and health matters. The committee should also monitor the workplace safety system (as determined by the safety and health program) to ensure that it is working properly. The school division remains ultimately accountable for the final decision.

The committee should be used to assess the effectiveness of the workplace safety and health program. The committee may conduct a safety and health inspection.

Responsibilities of Parents

Parents are thought of as an important part of an effective industrial arts/technology education safety and health program, as their support and understanding will help strengthen such a program. Parents complement the school effort by placing a strong value on safety and health while their children are at home, at work, involved in recreation, or being transported.

Their responsibilities include:

- To inform the school of health concerns that may affect their child's daily activities within the facility.
- To be aware of the potential illness and injury their children are exposed to during their education and training.
- To support the teacher and the school administration when penalties must be assigned for violations of safety and health rules.

If the child has a part-time job, parents should:

- Ask their children about the kind of work they do, and the health and safety training and supervision provided by the employer.
- Have an open discussion with their children about the possible dangers at their workplace, and special precautions they should take.
- Discuss their children's role in protecting themselves (e.g., do they wear the protective equipment provided for them?).
- Encourage their children to ask their supervisor and/or a safety and health committee member for help and to ask questions when they feel uncertain about safe work practices or activities. If they feel unsafe doing a job, they shouldn't do it.
- Discuss reporting requirements, should they have an injury at work (even a minor one). They should report all injuries to their supervisor and, if under the Workers Compensation Board, they must file an incident report. A copy should be given to their Workplace Safety and Health Committee.

2. SETTING UP AND MAINTAINING A SAFE INDUSTRIAL ARTS FACILITY

Achieving a Safe Facility

The intent of this section is to help the teacher achieve and maintain a safe facility.

Topics of this section include

- Safety and Health Inspections
- Personal Protective Equipment
- Machine Guarding
- Hazard Analysis
- Noise Hazards
- Incident Investigation Techniques

Safety and Health Inspections

Inspection

Purpose

To provide the teacher with an understanding of the inspection process and the ability to carry out an effective safety and health inspection. The following will introduce the teacher to:

1. Purpose of inspections
2. Types of inspections
3. Persons involved in the inspection process
4. Techniques
5. Methods of recording

Introduction

Safety and health inspections are an important part of the hazard control process. Regular inspections play an important part in providing a safe environment for our students.

Mandatory Inspections

Every school facility and each of its processes and operations contain potential hazards, which come about through normal use or through changes and additions of new equipment. One way of keeping aware of hazards is through continuous inspections.

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Inspection

Purpose of Inspection

- To spot potential hazards before an incident occurs.
- To assess the hazard.
- To find improvements and corrections to improve overall operations and increase effectiveness.
- Do all of the above, every day

Inspections may be classified as periodic or continuous.

Types of Inspection

Periodic Inspection

A safety and health inspection is thorough and systematic. These inspections can be conducted monthly or bi-monthly. This type of inspection covers all areas (e.g., operations, equipment, et cetera).

Continuous Inspection

Continuous inspections should be conducted by students, teachers, department heads, or supervisors as part of their instructional, supervisory, or assigned duties. Continuous inspections provide an immediate chance to examine and, if necessary, to correct or to report any unsafe situations (if correction is not possible).

Who Should Make Inspections

Teachers

Teachers must make continuous inspections and be aware of changing conditions, operations, and work methods. These inspections may have to be made several times a day (i.e., at the beginning of each day and, for certain equipment, at the beginning of each class).

Students

Student inspections allow students to take a major role in their lab/facility, thus giving them a sense of ownership of their lab/facility.

Department Head or Supervisors

A school/school division that has a department head or supervisor for industrial arts has a further advantage in safety and health inspections. The department head or supervisor may record any unsafe conditions and practices and forward the information to the teacher and or maintenance personnel if required.

Inspection Procedures

An inspection program requires that those conducting the inspections:

- have a sound knowledge of the facility.
- have a systematic inspection process for the facility.
- have a method of reporting, evaluating, and using the data gathered.

Using Safety and Health Checklist

There are many different types of checklists available for use in safety and health inspections, varying from thousands of items to just a few. Each type has its place and, when properly used, can be a benefit to the particular facility. An example of an inspection format is included at the end of Section 3. This format may be modified to accommodate most facilities.

Be Thorough

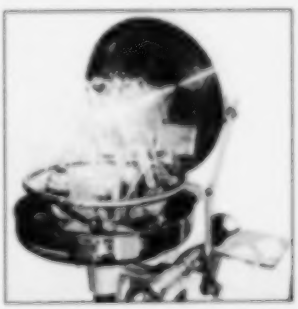
Any checklist for use in safety and health inspections is only as good as the method in which it is completed. The checklist is to be used as an aid in the inspection process, keeping in mind other items may have to be recorded. Any observed hazard must be recorded even though it may not be on the list.

What Should Be Inspected

When inspecting, the following should be considered:

- **Materials and Substances:** Inspect those materials and substances that may cause injury, illness, fire, or other hazards.
- **Machinery, Equipment, and Tools:** Ensure that they are free of defects and other hazards. Make sure guards, grounding (electrical), and exhaust systems are in place.
- **Personal Protective and Safety Equipment**: Ensure that there is adequate protection for all students involved and that the equipment is in good shape (i.e., safety glasses/shields are free from scratches, leather welding gloves are free from holes).
- **Working and Walking Surfaces**: Areas must be clean and functionally safe.
- **Environmental Factors**: Ensure lighting, ventilation, and noise control devices are up to standards.

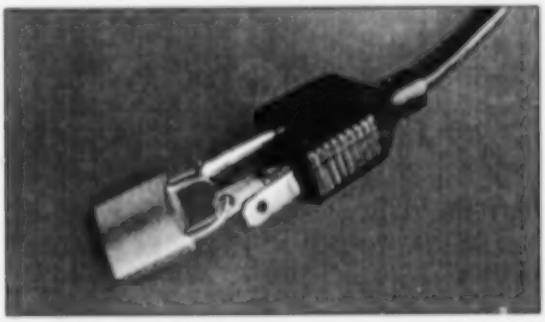
- **Housekeeping:** Material storage, waste disposal, floor, and counters should be neat and tidy.
- **First-Aid Kit and Eyewash Station:** Ensure the first-aid kit is stocked with adequate supplies and the eyewash station is functioning properly.
- **Electrical:** Switches, breakers, fuses, cords, and plugs must be in compliance with regulations.



- **Chemical Storage, Handling and Use:** Ensure that materials such as paints are stored properly (i.e., five gallons of paint or more must be stored in an approved flameproof cabinet). Specific protective clothing should be available for the chemical requirements. Adequate exhaust ventilation must be in place where stated by chemical requirements.
- **Fire Protection and Extinguishing Systems:** Fire blanket, fire exit doors, exit signs, et cetera, must all be in good order and in clear working condition.
- **Preventative Maintenance:** The teachers' consistent preventative maintenance in the lab/facility and with tools will help to ensure incident prevention and student safety.

Hazardous Equipment

In the process of inspection, various actions or corrections may have to take place. When a broken or damaged tool is found, the teacher should immediately remove it. Large equipment, however, may have to be properly tagged. The teacher may also need to perform an electrical lockout by placing a mini-padlock through one of the tines of the power cord plug to prevent unauthorized use of the tool.



Summary

Acting on the information gathered from an inspection is as important as conducting the inspection in the first place. It is necessary that the inspection team brings problems and recommendations for corrective action to the attention of those involved (i.e., teacher, principal, or Workplace Safety and Health Committee). Based on problems uncovered and recommendations by Workplace Safety and Health, they must decide on the best course of action.

Information from inspections should never be seen as fault finding and criticism, but rather as fact finding with an emphasis on locating potential hazards that may have an adverse effect on the safety of the operation. The information should be viewed as the basis for establishing priorities and implementing programs that will improve conditions to provide a safe environment for our students.

Personal Protective Equipment (PPE)

PPE does not take the place of such engineering controls as substitution, isolation, and ventilation. PPE are such items as helmets, glasses, goggles, face shields, special footwear, respirators, and other items that protect the student against hazards such as flying particles, noise, chemicals, and electric shock.

Sometimes the only practical way to reduce illness and injuries is to use personal protective equipment. The first method is to control the problem at its source; the second is to control it along the path. PPE is regarded as the last line of defense.

Selecting Personal Protective Equipment

- The extent of the hazard's potential to cause harm must be determined.
- The degree of desired protection is in direct proportion to the seriousness of the hazard.
- The equipment's ability to protect must be considered along with its potential to interfere with the students' work.
- Protective equipment, particularly for eyes and face, must be approved by the Canadian Standards Association (CSA).
- Quality is an important factor to consider. Good protective equipment may not be inexpensive, but may last considerably longer than lower grade PPE.

PPE Fit

The PPE must fit the student. Poorly fitted protective equipment discourages students' acceptance, and may hinder their work and safety.

Education

Unless students are educated in the use and care of PPE, it may do little to fulfill its intended purpose.

PPE Requirements

Head Protection

There is always a danger of hair becoming entangled in moving parts. Students with long hair should have their hair tied back, secured, or tucked underneath their clothing.

Helmets are the best means for protecting students against impact blows from falling objects.

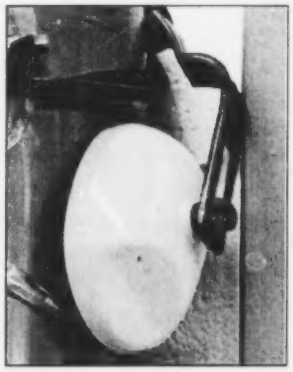
Eye and Face Protection

In the industrial arts facilities, students' eyes can be exposed to a variety of hazards (e.g., flying objects, splashes of corrosive liquids or molten metal, dust, and harmful radiation). Manitoba Workplace Safety and Health requires that eye and face protection be designed to meet standards.

The type of face shields and safety glasses used must meet their intended purpose. A variety of types and sizes of safety glasses give the student an opportunity to select his or her "own style." Glasses that are damaged by pitting or scratching must be replaced. A weekly check of their condition is essential.

Personal Protective Equipment

Hearing Protection



The need for hearing protection arises when source control and/or path control are not present, when source and/or path control do not lower noises to safe levels, or when a person in the facility cannot avoid direct exposure to noisy equipment and tools.

Many types of personal hearing protection devices are available, ranging from ear plugs to cup-type hearing protectors. Selection of a protective device is governed by individual preference. Important factors to consider are effectiveness, comfort, and cost.

Respiratory Protection

The human respiratory system presents the quickest and most direct avenue of entry of hazardous materials, because it is connected with the circulatory system and the need to oxygenate tissue cells. Air may be contaminated with dusts, fumes, and sprays. The most important objective is to prevent atmospheric contamination. This should be accomplished by engineering control measures (e.g., enclosure or confinement of operation, general and local ventilation, and substitution of less toxic material). When effective engineering controls are not feasible, appropriate respirators must be used.

Hand Protection

Statistics indicate injuries to the arms, hands, and fingers account for more than a quarter of all disabling mishaps. The hazards in the industrial arts facilities are similar to those in industry: molten metal, heat, sharp objects, and corrosives.

Many industrial incidents are the result of operating machinery, using tools, or handling materials. PPE can do little to prevent incidents in the first of these areas. Gloves can snag in revolving parts and pull the hand into the machinery.

Gloves supplement good work practices to prevent hand injuries during handling of tools and materials. There are many types of gloves that are suitable for abrasions, cuts, oils, chemicals, radiation, heat, and flame.

Body, Foot, and Leg Protection

Students require protection from the hazards of molten metal, sparks, splashing liquids, heat, and cutting.

Welders need aprons made of fire-resistant fabric or leather. Personal protective footwear can protect feet against injuries, such as those from falling objects, accidental contact with sheet metal, and sparks from welding and cutting operations.

Although safety shoes may present the ideal protection for feet, this may be impractical in certain situations. Some alternatives that may better fit particular situations could be foot guards, which protect the toes and instep against falling objects or a combination foot and skin guard, which protects both against flying particles and sparks from cutting/welding.

Machine Guarding

It is estimated that nearly 20 percent of all permanent partial disabilities result from injuries associated with machinery. Poorly designed, improperly guarded, or unguarded machinery are detriments to the educational system.

Machine guarding is of the utmost importance in protecting students in the industrial arts facility. Machine guarding is not optional but required. Guarding is a means of effectively preventing students from coming into contact with those moving parts of machinery or equipment, which could cause physical harm.

Sources to be Guarded Against

Sources of injury that guarding can protect:

- direct contact with the moving parts of a machine
- contact with work in progress
- mechanical failure
- electrical failure
- human failure or error

Hazardous Areas

Typical hazardous mechanisms that need to be safeguarded are:

- rotating mechanisms
- cutting and shearing mechanisms
- screw or worm mechanisms

The Acceptable Guard

The following are requirements for an acceptable guard:

- It should protect the operator.
- It should protect others nearby.
- It should be an integral part of the machine.
- It should be convenient to the operator.
- It should prevent access to the danger zone.
- It should not create an incident hazard in itself.

For more information on guarding, obtain the booklet *Guidelines for Machine Guarding* (September 1988) from Workplace Safety and Health Support and Development. This information is also available online at <http://www.gov.mb.ca/labour/safety/publication/guidelines/machine/>. For regulatory requirements regarding the safeguarding of machinery and equipment, please consult the regulations adopted under *The Workplace Safety and Health Act*.

Hazard Analysis

The benefit of hazard analysis is to increase the awareness of potential hazards.

Results of Hazard Analysis

Hazard analysis should help to:

- improve instructional quality.
- assist in the selection of processes and tasks.
- create awareness of possible incidents.
- establishing control measures (special procedures, guarding, PPE).
- set up equipment and machinery so that students or the teacher will not be exposed to unnecessary hazards.
- identify situational hazards in facilities (equipment, tools, and materials).
- identify human factors responsible for incidents (student capabilities, activities, and limitations).
- identify exposure factors that contribute to injury and illness (contact with hazardous substances and materials).
- determine safe inspection methods and maintenance standards.

Who Should Participate in Hazard Analysis?

The teacher may initiate the analysis of the processes, operations, and tasks; however, others may also give assistance (i.e., Department heads, maintenance personnel, colleagues, manufacturing representatives, and students).

Note: Remember to check out the specific equipment manual for proper procedures.

What To Analyze?

There are many processes, operations, and tasks conducted that have potential hazards.

Consideration should be given to:

- general housekeeping.
- inappropriate use of tools and equipment.
- faulty tools and equipment.
- new or altered processes.
- potential for injury.
- severity of injury.
- frequency of incidents.

SPOT THE HAZARD.
ASSESS THE RISK.
FIND A SAFER WAY.
EVERY DAY.

The Process of Hazard Control

The four processes in hazard control are:

1. Spot the hazard.
2. Assess the risk.
3. Find a safer way.
4. Practise all of the above every day.

Noise Hazards

Everyone at some time is exposed to noises that have the potential to damage the hearing. Ordinary noises (e.g., those produced by planers and jointers) can cause hearing damage if there is extended exposure time. Noises at high levels of intensity do not require lengthy exposure time to cause hearing damage.

Permanent Threshold Shift

A Permanent Threshold Shift is a condition in which we permanently lose the ability to hear sounds at lower decibel levels. One of the most harmful effects of such a hearing loss is that we lose some of our ability to understand speech. This damage can result from a single exposure to a very high intensity noise but most often is a result of exposure to moderately intense noise over an extended period of time.

How Noise Damages Hearing

How intense must noise be before it has the potential to either temporarily or permanently damage our hearing? There is no simple definitive answer to this question. There are too many variables involved. The four most significant variables are:

1. the level of sound, as measured in decibels.
2. the length of time to which we are exposed to the sound.
3. the number and length of quiet (recovery) period between period of sound.
4. our personal sensitivity to or tolerance for sound.

Noise Control

There are four basic ways to control noise:

1. At the source.
   - Reduce impact noise.
   - Reduce speed of moving parts.
   - Isolate vibration within equipment.
   - Reduce the leakage of noise.
2. Along the path.
   - Contain or enclose the noise.
   - Absorb the noise along its path.

- Deflect the noise.
- Separate the noise from the hearer.

3. At the point of hearing (PPE).
   - Ear plugs
   - Cup-type ear protectors
4. Management of noise.
   - Schedule activities that create excessive noise.
   - Alternate methods of operation.
   - Vary facility activities.

Purchasing/Procedure

The management of noise control refers to the administrative decisions that are made to purchase certain types of equipment and tools, to use certain procedures, and to schedule work during certain times to minimize the number of persons exposed to high noise levels. Scheduling the noisy procedures for several short periods of time during a day or over a number of days, rather than in one long continuous period, reduces the hazard.

How Much Noise Is in Your Lab?

In order to determine the amount of noise in your facility, you should conduct an exposure assessment. Obtain a sound level meter or decimeter from your supervisor, principal, school division, Manitoba Workplace Safety and Health Division, or hire a consultant to complete the assessment.

The following has been adapted from *Hearing Conservation and Noise Control* Regulation 227/94 from Workplace Safety and Health, Manitoba.

dBA

Noise is measured by A-Weighted Sound Level (dBA). The sound level is measured on a sound level meter equipped with an A-weighting filet that electronically filets out much of the low and high frequency sound in order to simulate the response of the human ear.

Exposure Greater Than 80 dBA

Students and teachers should be provided with training and education to inform them of their exposure assessment results and about the hazards of excessive noise exposure.

Exposure Greater Than 85 dBA

For all students and teachers exposed to greater than 85 dBA, personal hearing protection (and training in its proper use) must be made available. Any worker who is exposed in excess on Lex of 85 dBA, and who requests such protection, must receive it.

(continued)

Exposure Greater Than 90 dBA

For all exposures where they exceed 90 dBA, the employer must investigate and implement all reasonable practisable engineering or work practice controls in order to reduce exposures to 90 dBA or lower. Where exposures are not reduced to 90 dBA, provision and use of personal hearing protection is mandatory.

Definition of Lex

Equivalent Sound Exposure Level (Lex): This is the steady sound level that, if present in a workplace for eight hours in one day, would contain the same total acoustical energy as that contained by the actual fluctuating sound levels to which a worker is exposed during the actual work day. Sound exposure level is measured or calculated on the basis of sound levels (dBA) and duration of exposure to each of those sound levels during the workday. It represents the worker's daily average exposure (time-weighted average sound level).

Incident Investigation Techniques

The goal of facility operations hazard analysis is to identify and evaluate hazards in the facility before they result in incidents. The concept behind this is sound, however, there may be times when we will not be able to find and eliminate problems before incidents occur. When an incident occurs, we must be prepared to acquire through investigation as much information as possible about the cause so that similar incidents can be avoided.

Reasons for Investigation

Teachers should become familiar with school/school division policies regarding incident investigation. There are important reasons for investigating incidents.

- To determine the cause of the incident.
- To find out ways to prevent further similar incidents.
- To uncover and reduce indirect incident causes.

Fact Finding not Fault Finding

Remember incident investigation is fact finding rather than fault finding. The intent of the investigation is to find the cause and/or reason of the error/defect, and make the necessary corrections so further incidents can be avoided.

Investigate—Yes or No?

All incidents should be investigated. Most incidents are usually minor, however, there may be a fine line before that situation could have resulted in a serious incident.

Investigation by the Teacher

The teacher is the best one to do the investigation. The teacher is the one who was in the room at the time of the incident. The teacher is:

- familiar with the students, their abilities, and their personal characteristics.
- aware of the equipment, tools, and operations.

Key Points for Interviewing

When investigating an incident, these key points are important:

- Conduct the interview as soon as possible.
- Interview one person at a time.
- Explain the purpose of the investigation.
- Make the witnesses feel at ease.
- Be diplomatic in your task.
- Keep the questions simple.
- Avoid leading questions.
- Allow students to explain in their own words, uninterrupted, their story of the situation.
- Review the information given.
- Allow students to explain how the same incident can be prevented in the future.

3. TEACHER RESOURCE PACKAGE

The intent of this section is to provide examples of handouts, signs, and other practical sample sheets.

Instructional Techniques

- Present safety instruction with the following objectives in mind:
  - — Develop in students a sense of responsibility for their own safety and that of others.
  - — Emphasize the importance of PPE and their choice of clothing.
  - — Help students understand that the safe way of doing things is the best way.
  - — Help students recognize situations and their potential hazards.
  - — Help students learn safe practices that they will continue to use in their day-to-day lives.
- Reinforce safety consciousness in students through example. Always do things the safe way while indicating the potential hazards.
- Demonstrate the safe use of machines and tools. Document instructions, attendance, and students' safety scores.
- Present instruction on the proper care and use of personal protective devices.
- Provide instruction on what to do in case of an accident.
- Provide instruction not only on the use of equipment but also on the basic maintenance of tools, machines, and other equipment.
- Involve students in completing a job hazard analysis.
- Get students involved in starting a student safety committee designed to help strengthen existing safety programs.

Student Safety Commitment

As a student in the lab/facility, it is important to observe safety rules, and to know and understand safety and health hazards associated with tools, machines, and processes. In all situations, one must use the SAFE method of dealing with hazards in the facility.

Students must:

- not enter the lab/facility unless a teacher is present.
- report all injuries and incidents to the teacher.
- know where the fire exit is.
- act appropriately. (Horseplay will not be tolerated.)
- wear eye protection for activities as outlined by the teacher.
- avoid handling tools, equipment, or materials without previous instruction and permission from the teacher.
- tie back long hair.
- wear appropriate clothing and safe footwear.
- read all labels and follow instructions when using any chemicals such as paints, glue, et cetera.
- report any broken tools, equipment, or hazardous situations to the teacher immediately.
- know and follow the safety rules that apply to each machine they use.
- pay attention to all lessons and demonstrations.
- know the operator's safety zone.
- keep floor and work surfaces free from clutter.
- report any spills immediately to the teacher.
- practise good housekeeping techniques.

I have read and understand these rules and promise to obey them.

_____ _____

Student's name (printed) Student's signature

_____

Date

Student Safety Record

Outcome: _____

_____

Student's Name: _____ School _____

Course _____ Feeder School _____

Teacher _____

This record is an indication of the tools and/or machines in which the student has witnessed teacher demonstrations, has successfully completed the written test, and has demonstrated safe operation to the teacher.

Enter Date Completed			
Tool/Machine	**Teacher Demonstration**	**Test Score**	**Student Demonstration**
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Teacher Observation Safety Report

Course: _____ Teacher _____

School _____ Class Period _____

Observation/Codes

1. Demonstrates leadership in safe practices.
2. Observes and obeys all safe work procedures.
3. Needs to be reminded to wear safety equipment.
4. Needs to be reminded to pay attention to demonstrations.
5. Demonstrates unsafe behaviour.
6. Demonstrates poor clean-up participation.

	Enter Date													
Student Name														
1.														
2.														
3.														
4.														
5.														
6.														
7.														
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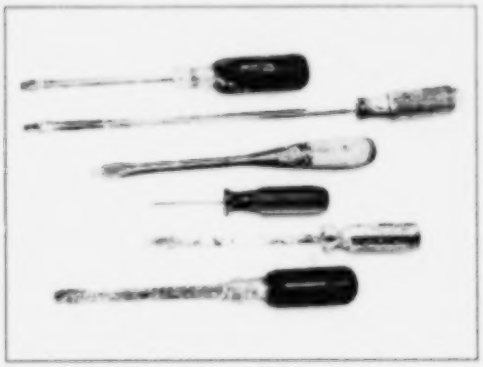
15.														

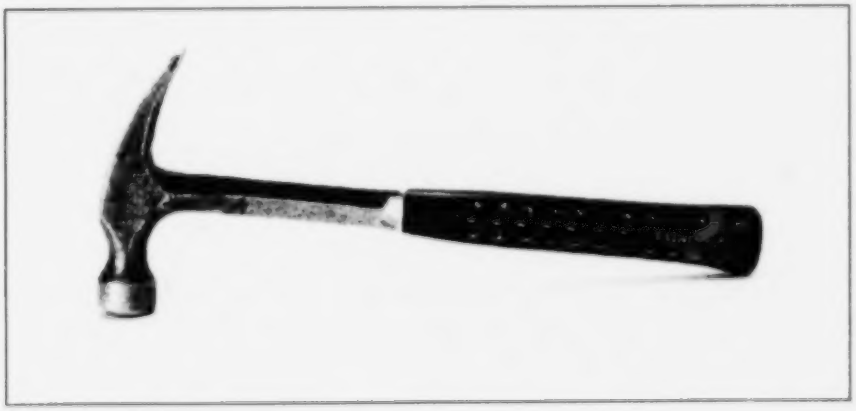
Hand Tools—Safety Procedures



- Use tools for their designed purpose.
- Carry all sharp and pointed tools or objects with the sharp end in a downward position.
- Remove jewelry where conditions are warranted.
- Wear eye protection at all times.
- When using hand tools, balance weight equally on both feet.
- When loosening or tightening nuts and bolts, be careful that the wrench does not slip or give way suddenly. This can be dangerous to fingers and knuckles.
- Place pressure on the solid jaw of an adjustable wrench.
- Consider where other people are, especially when cutting or chipping off rivets or burrs.
- Ensure that tools with handles are safe and that the handles are securely mounted. Check tools before use (e.g., hammer handle and head).
- Report any damaged or worn tools, which are unsafe.
- Always cut away from your body and keep both hands behind the cutting edge.
- Close all vises when not in use.
- Files must be used with properly fitting handles.

SAFE MANITOBA

SPOT THE HAZARD.
ASSESS THE RISK.
FIND A SAFER WAY.
EVERY DAY.



Portable Power Tools—Safety Procedures

- Remove all jewelry
- Before operating any power tool for the first time, the teacher must demonstrate the correct procedure of operation and the safety guards that are used.
- Make all adjustments to the power tool before plugging it in.
- Read the safety rules and instructions regarding each machine tool.
- Check the power cord and ensure the ground wire is not missing or broken.
- Ensure work area is clean and free from debris.
- Avoid loose power cords on the floor.
- Power tools should not be operated in the vicinity of flammable materials.
- Never use a damaged or defective power tool.
- Use all guards supplied by the manufacturer.
- Assess the job to see if other safety gear should be worn (i.e., face shield and hearing protection).
- Remove all wrenches or chuck keys from the power tool after completing the setup.
- Secure any loose clothing, draw strings from hoods, or long hair, which can get entangled in moving parts.
- Look around and ensure that no one is in direct line with fast moving discs, such as saws, grinders, and wheels.
- Allow power tools to reach full working speed before starting the task.
- If you need the attention of someone operating a power tool, wait until they have finished their task.
- Set a power tool down once it has come to a complete stop.
- Unplug the tool before changing bits or blades.
- Remove the plug from the receptacle by grasping the plug not the cord.
- Clean up the area when finished. Good housekeeping promotes safety.
- Disconnect all portable power tools when not in use.
- When shutting off a power tool, let it come to a complete stop by itself.
- Guide power tools – do not force them.
- Use two hands on the power tool when required.
- When using power tools, remember to balance weight equally on both feet. Proper stance will help prevent incidents.
- Secure all work by clamping, if possible.

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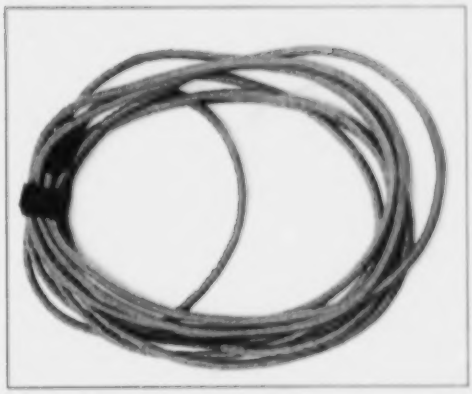
Electrical Cords—Safety Procedures



- Electrical portable tools must be properly grounded. Check to see that ground wires are not missing or broken.
- Carry a power tool by the handle and remove the plug to disconnect it from a receptacle.
- Keep electrical cords from heat, oil, moisture, or sharp edges.
- Avoid contacting or cutting power cords during use of power tools.
- Always use power tools in a dry condition and a safe environment if the surrounding area is wet.
- Avoid loose extension cords on floors.

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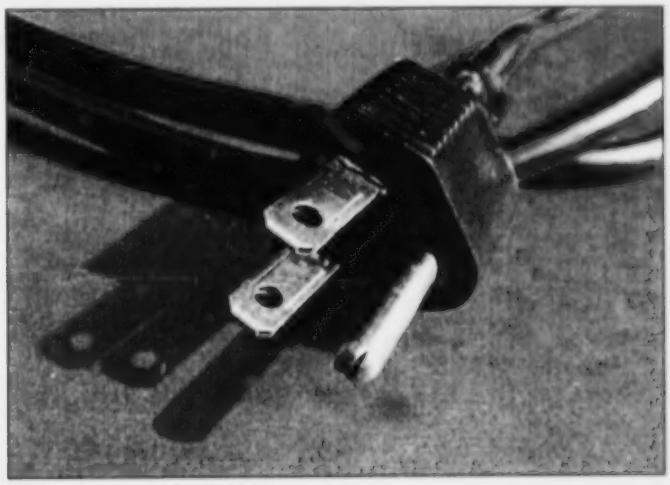

General Equipment—Safety Procedures

- Remove all rings, watches, and jewelry when using equipment.
- Power must be turned off when machines are not in use.
- Read and understand the safety rules and instructions regarding each machine. **Remember, when in doubt, ASK.**

SAFE MANITOBA

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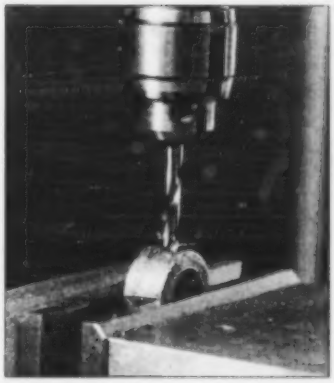
- Keep the floor and work area clean.
- Always keep tools, hands, clothing, and hair away from all moving parts.
- Only operate machines with the teacher's prior instructions, demonstrations, and permission.
- When operating any machine, always follow all safety rules and procedures dealing with that machine and task.
- Before starting the machine, make sure that both the work and the cutting tool are secured.
- Report any damaged or defective tools or machines to the teacher.
- Use all guards and hold-down devices on the machine that will add to the safety of the operator.
- Machines with loose or poorly secured guards must be properly adjusted before using them.
- Inform the teachers if you suspect anything wrong with the grounding system or the machine.
- Wear proper eye/face protection as required.
- Wear proper clothing and hearing protection as required.
- Certain types of guards are adjustable. Make sure the guards are adjusted to give the maximum protection.
- If you are working with another student, only one should operate the machine and power switch.
- Always remove all tools from the machine after completing setup.
- Stay clear whenever power machines are being started. Do not have loose clothing or long hair, et cetera, around revolving parts.
- Keep fingers as far away from the machine as the size of work permits and never closer than 130 mm. Use teacher-provided push sticks.
- Stand to the side of fast-moving discs, such as saws, grinders, and wheels.
- Always allow machines to reach proper working speed before commencing work.
- Avoid distractions of any form. Talking or someone standing too close can be dangerous practice to the operator. Wait until the operator is finished before getting his or her attention.
- Always keep your hands away from the work when the machine is running.

Drill Press—Safety Procedures



- Eye protection must be worn at all times.
- Loose clothing, jewelry, and drawstrings must be secured when operating a drill press.
- Long hair must be secured so it is not a safety hazard.
- Clamp all work securely before starting the machine.
- Select the correct bit, and ensure it is in good condition.
- Make sure the chuck wrenches have been removed from the drill chuck before starting the machine.
- Drill slowly. Forcing will cause the drill to break or splinter.
- Avoid reaching around or in back of any rotating drill.
- Always clear debris with a chip brush.
- Always ensure the machine has come to a complete stop and the electrical plug is removed before changing the belt for speed regulation.
- If the drill sticks in the work, stop the motor by turning it off, wait until it comes to a complete stop, and rotate the drill by hand to free it from the work. Call the teacher if in doubt.
- Always clear away chips and metal curls with a hand brush, and only when the machine has come to a complete stop.

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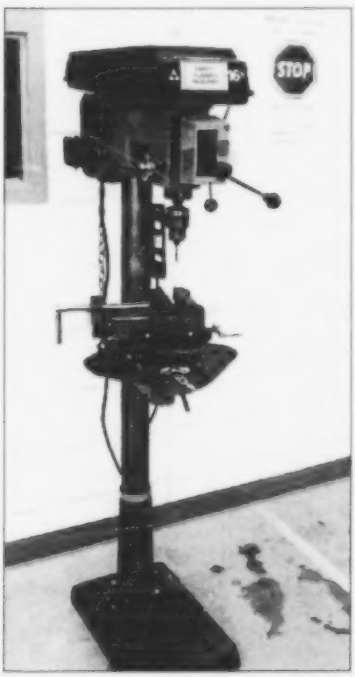
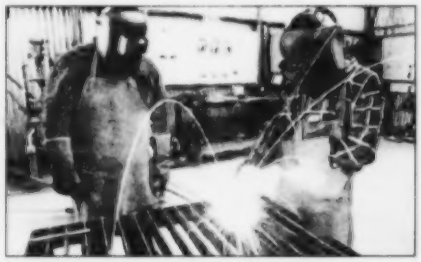


Protective Clothing



- Be sure to wear appropriate safety glasses as set by the teacher.
- Tasks such as spot welding, arc, mig, gas welding, and plasma cutting require special eye and face protection as well as special clothing requirements.
- Wear appropriate footwear.
- Wear clothing that is suitable to that specific lab/facility.
- If conditions exist where the noise levels are high, wear approved hearing protection.
- Where overhead hazards exist, hardhats may be necessary.

SAFE MANITOBA

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Hazardous Products—Safety Procedures

- All containers containing hazardous products must be labelled as to their contents. Take time to read the label and ensure you are following the precautions and wearing specific safety gear as noted.
- All hazardous products must have current (no older than three years) Material Safety Data Sheets. Know where these are located.
- Some products require adequate ventilation. Ask your teacher where they can be used.
- If corrosive or explosive liquids or oils are spilled, they must be neutralized first and cleaned up immediately. Ask your teacher for the clean-up procedure.
- Know the symbols for hazardous products.
- Use a special vacuum to clean up hazardous areas of dust, particles, et cetera, and dispose of materials properly.
- Etchants used in electronics, such as ferric chloride or ammonium persulfate, must be used with extreme caution. Read and follow instructions on the label.
- Use sealable containers to store flammable liquid at all times.
- Use approved safe cleaners for cleaning hands or clothing.
- When finished using products such as paint or solvents, put the lid on securely and place the item back in the approved fireproof container.
- Welding and cutting operations must not be allowed in the vicinity of the vehicle fuel tank or lines.
- Extension lamps and power tools must be kept away from leaking gas lines, tanks, or spills.
- The varsol (parts) cleaning tank must be used with adequate ventilation, face protection, and rubber gloves.
- The lid of the varsol tank must be kept closed when not in use.
- Penetrating fluid and brake fluid can react with paints, plastics, et cetera. Treat them with caution and wipe up spills following the directions as outlined by the teacher.

SAFE MANITOBA

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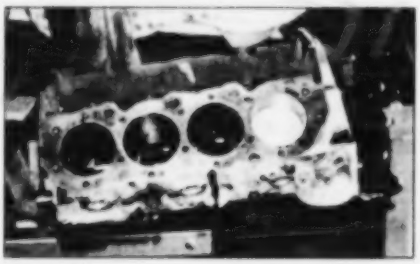
Hoist and Lifting Devices—Safety Procedures



- Your teacher must supervise as you hoist a vehicle.
- When lifting a vehicle, there must be an observer positioned to the side of and well away from the vehicle to assist the hoist operator in raising the vehicle at an even level.
- To prevent damage, the hoist must be fully lowered before the vehicle is to be moved.
- Hoist posts and/or pads must be correctly positioned to the individual vehicle before a lift is attempted.
- Students must only work under vehicles in a full lift position with safety locks engaged.
- Operators must always face the lift vehicle while the lift is underway.
- Hoists must be regularly inspected for proper operation and safe condition by competent personnel.
- Before working under any vehicle, it must be supported securely on approved stands at the correct lift points.
- Always check the rated capacity of any lifting crane.
- Cranes are meant for vertical lifts only.
- Never jack up a vehicle while someone is working underneath the vehicle.
- Jacks must be used within their rated capacity. The lift must be vertical and never on an angle.
- Engine slings must be securely fastened to the engine before lifting. Fasteners must be of correct sizes for the lifting weight and fully tightened to secure sling lugs.
- Overhead lab/facility doors should only be operated when the doorway is free of people and obstructions.

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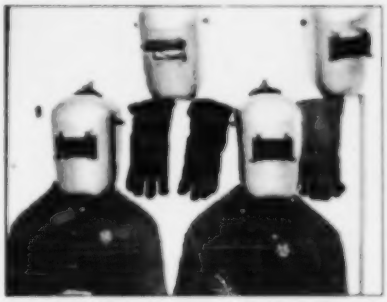
Welding—Safety Procedures

Personal Protective Equipment



- Wear leather gloves for handling metals.
- Use pliers or vise grips when handling hot materials.
- Safety glasses and face shields must be worn when chipping, grinding, drilling, punching, chiseling, spot welding, or wire brushing.
- Frayed and greasy clothing can catch fire easily during welding, cutting, or grinding operations.
- Proper clothing must be worn (denim and leather are recommended). Avoid materials such as nylon.
- Lighters or matches are never allowed in any welding area.
- Wear appropriate eye, face, body, leg, and foot protection as set forth by the teacher.

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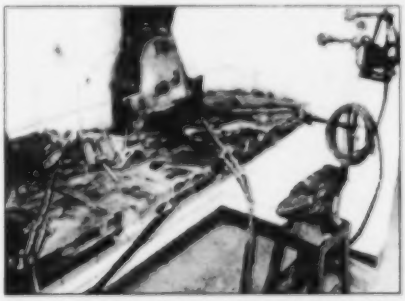
EVERY DAY.

Housekeeping



- Sheet metal and other sharp-edged materials must be stored in protected-style storage areas and handled with care.
- Always sweep the weld area before welding and ensure all flammable materials are removed.
- Keep the welding area free of metal chips and weld splatter.
- Welding and cutting operations must not be allowed in the vicinity of the vehicle fuel tank or fuel lines.

SAFE MANITOBA

SPOT THE HAZARD.
ASSESS THE RISK.
FIND A SAFER WAY.
EVERY DAY.

Gas Welding

- Gas welding must be done in a place that provides for adequate ventilation, which removes fumes, dust, and gases from the air.
- Welding galvanized materials releases toxic gasses, which we want to avoid. If in doubt of the material, ask your teacher.
- Know where the fire blanket is located.
- Lighters and matches must never be allowed in the welding area.
- Oil or grease on cylinder fittings may cause an explosion. Avoid these materials around the area.
- Follow the proper lighting and extinguishing techniques for the welding torch as set out by the teacher.
- Gas cylinders must be fitted with safety caps when in storage or transit.
- Gas cylinders must be chained securely in the vertical position.
- Use a striker to light the oxygen/acetylene/flame.
- One to one-and-one-half turns on the acetylene cylinder valve allow a full flow from the cylinder, yet allow fast shut-down in an emergency.
- Acetylene must be set at pressures lower than 15 PSI.

Electric Welding

- Always keep welding stations and clothing dry to avoid electric shock.
- Keep electric arc away from flammable materials.
- Lighters and matches are never allowed in the welding area.
- The welding arc produces ultraviolet rays that destroy skin cells. All exposed skin areas must be covered.
- Welders must be protected by an approved welding helmet and heat-/spark-resistant clothing (leather preferred).
- All people in the room must be protected from the rays of electric welding. Protective curtains must be fully drawn.
- Only strike an arc when you and others are ready and suitably protected.

Hazard Analysis – Student Exercise

The teacher can distribute the following Lab Operations Hazard Analysis form. Dividing the students into groups of five with each team appointing a leader, the team can devote time to attempting to add to and improve information on the analysis format. The analysis format is for the operation of drilling and countersinking stock on the drill press.

Each team is to concentrate on a different major operation. At the end of the timed period allocated by the teacher, each team leader summarizes for the class the findings of their team.

Lab Operations Hazard Analysis				
Task	**Potential Hazard**	**Condition Triggering Hazard into Incident**	**Lab Procedural Requirements**	**Safety and PPE Requirements**

Lab Operations Hazard Analysis				
Task	**Potential Hazard**	**Condition Triggering Hazard into Incident**	**Lab Procedural Requirements**	**Safety and PPE Requirements**
1) Inspect and set up drill press.	Defective chuck, switches, clamps, cord, etc.	Operating drill press with defective parts.	Do not operate drill press if defective. Attach "Do Not Operate" tag.	
2) Centre-punch holes at both ends of work-piece.	Work-piece not securely clamped while centre-punching holes.	Work-piece slipping from underneath punch when punch is hit with hammer.	Work-piece is to be secured in vise before striking punch. Select No. 2 combination drill and countersink.	
3) Drill and countersink centre holes on drill press.	Placing work-piece in position for drilling without clamping in vise.	Bringing drill in contact with work-piece.	Work-piece is to be secured in vise before drilling holes.	
	Leaving chuck wrench in chuck at time when machine is started.	Starting drill press.	Chuck wrench to be removed prior to starting machine.	
	Stop/start buttons not located within easy reach of operators, causing student to reach behind or alongside moving part or not being able to shut off machine in an emergency.	Starting machine; having to shut machine off (normally); having to shut machine off in an emergency.	Stop/start button to be located within easy access of operator.	Start/stop buttons identified with bright colours.
	Students with long hair, long-sleeved shirt, baggy clothing, drawstrings on hooded sweater	Clothing, hair, etc. coming into contact with drill or chuck while machine is in operation.	Sleeves rolled up, hair in nets or tied back, baggy clothing and drawstring secured.	
	Rotating drill in chuck.	Students' hand or arm coming in contact with spinning drill.	Student to fully concentrate on operations.	
	Drill breaking during drilling mode.	Excessive pressure placed on drill and/or not lubricating drill.	Drill should not be jammed down into stock; use slow and even pressure; lubricate.	Face shield and/or goggles.
	Flying metal chips.	Working on drill press.	If excessive chips begin to fly from work-piece, shut off machine and ask for assistance.	Face shield and/or goggles.
	Metal chips created during drilling procedure.	Student attempting to remove chips while machine is running.	Drill press is to be shut off and chips cleaned with brush.	
	Drill sticks in work.	Drilling stock.	Stop machine, free by hand.	
	Pinch points at belts.	Adjusting belts.	Always stop press before adjusting belts.	

Hazard Analysis

School Name: _____ **Date:** _____

Task:	**Facility:**	**Conducted By:**
Task Steps	**Hazards**	**Corrective Actions**

Hazard Analysis

School Name: _____ **Date:** _____

Task:	**Facility:**	**Conducted By:**

Hazards Present:

Personal Protective Equipment Required:

Safe Work Procedure:

Industrial Arts Accident/Injury Report

Name of Student: _____ Facility: _____

Date: _____

School: _____ Teacher: _____

Date of Accident: _____ Time of Accident: _____

Description of Injured

Birth date: _____ Age: _____ Sex: _____

Grade level : _____

Injury Type

- ❑ struck against
- ❑ struck by
- ❑ fall
- ❑ slipped/tripped
- ❑ abrasion
- ❑ Contacted (electrical, chemical, etc.)

Did student:	Yes	No
receive training for task?	❑	❑
operate according to safe/appropriate practices?	❑	❑
use proper equipment?	❑	❑
operate without authority?	❑	❑
use appropriate PPE?	❑	❑
behave appropriately?	❑	❑

Draw a line from injury to body part(s). For multiple injuries draw multiple lines.

sprain	head
strain	eye
	face
contusion/bruise	ear
	neck
abrasion	shoulder
	chest
laceration	lungs
	abdomen
puncture	back
	upper arm
burns (heat, flame, chemical)	elbow
	forearm
fracture	wrist
	hand
foreign body in eye	finger
	thigh
electrical shock	lower leg
	ankle
other _____	foot
	toe
	knee
	other

Description of Environment	Yes	No
Illumination/lighting sufficient?	❑	❑
Chemicals (if known)	❑	❑
Fume	❑	❑
Dust	❑	❑
Other _____	❑	❑

Describe in detail how the accident happened.

_____

_____

_____

_____

Did the students receive outside medical attention? If yes, where?

_____

_____

Were the parents notified of the student's injury?

_____

Teacher's Record

Name of Student: _____ Grade: _____

Lab/Facility: _____ Date: _____

Home of School: _____ School: _____

Teacher: _____ Date of Accident: _____

Name of Injured Student	Date of Injury	Where Incident Happened	Nature of Injury	Part of Body	Source of Injury	Tools/ Equipment Used	Hazardous Condition	Cause of Accident
Bart Simpson	1/18/05	Shop Class (Room 18)	Cut requiring 10 stitches	Right hand	Saw blade	Band saw	Unguarded blade	• Failure to adjust guard properly. • Failure to use push stick.

Instructor Safety and Health Checklist

For Industrial Arts Facilities

School: _____ Date: _____

Instructor: _____ Facility: _____

Circle the appropriate rating
S = Satisfactory, U = Unsatisfactory, N/A = Not Applicable

A. General Physical Condition

S	U	N/A	1. Tables, machines, and equipment are arranged to allow safe working conditions.
S	U	N/A	2. Aisles are unobstructed.
S	U	N/A	3. Surfaces are clean.
S	U	N/A	4. Exhaust fans are in working condition.
S	U	N/A	5. Fire extinguishers are fully charged.
S	U	N/A	6. Exit doors are clear and unobstructed.

Comments: _____

B. Housekeeping

S	U	N/A	1. General appearance is neat and orderly.
S	U	N/A	2. Tools are located easily at the tool panel.
S	U	N/A	3. Tables are clean.
S	U	N/A	4. Corners are clean and clear.
S	U	N/A	5. Materials are stored in an orderly and safe condition.
S	U	N/A	6. Dangerous materials such as paints and chemicals are stored in metal cabinets.
S	U	N/A	7. An approved metal container is provided for waste and oily rags.
S	U	N/A	8. Floors are clean of oil, water, and other foreign material.
S	U	N/A	9. Floors, walls, and windows are cleaned periodically.

Comments: _____

C. Equipment

S	U	N/A	1. Machines are arranged so that students are protected from hazards of their own machines, other machines, passing students, etc.
S	U	N/A	2. Danger zones are properly indicated/or guarded.
S	U	N/A	3. Enclosure guards protect all moving belts and gears.
S	U	N/A	4. All guards for blades and belts are in use.
S	U	N/A	5. All equipment control switches are easily accessible to the student.
S	U	N/A	6. All machines and power tools can be powered off when the instructor is out of the room.
S	U	N/A	7. Machines are in safe working condition.
S	U	N/A	8. Hand tools are kept clean, their handles in good condition, and they are in safe working order.

Comments: _____

Instructor Safety and Health Checklist (continued)

D. Electrical

S	U	N/A	1. All switches and outlets are in good condition.
S	U	N/A	2. Emergency stop switches are located throughout the room and are easily accessible.
S	U	N/A	3. Male ends of electrical cords have their proper ground blades in place.
S	U	N/A	4. A master control switch is in use for all equipment and tools.

Comments: _____

E. Personal Protective Equipment

S	U	N/A	1. Appropriate safety glasses are provided and are in good condition.
S	U	N/A	2. Hearing protectors are available.
S	U	N/A	3. Appropriate gas welding goggles and welding helmet are available.
S	U	N/A	4. Proper wearing apparel is available for the job being done.
S	U	N/A	5. Respirators are available for dusty or toxic atmospheres such as spray painting or using toxic solvents.
S	U	N/A	6. Other students are protected from electric welding by curtains.
S	U	N/A	7. First-aid kit is adequate and easily located.
S	U	N/A	8. Eyewash station is clean and functioning properly.

Comments: _____

F. WHMIS

S	U	N/A	1. WHMIS centre is up and placed in an easily accessible location.
S	U	N/A	2. Material safety data sheets are available for every applicable item in the facility.
S	U	N/A	3. All applicable items as above are labelled.
S	U	N/A	4. Students are made aware of WHMIS and its purpose.
S	U	N/A	5. Students are tested on their WHMIS understanding.

Comments: _____

Student Safety and Health Checklist

For Industrial Arts Facilities

School: _____ Date: _____

Students: _____ Facility: _____

_____ _____

_____ _____

Circle the appropriate rating

S = Satisfactory, U = Unsatisfactory, N/A = Not Applicable

A. General Physical Condition

S	U	N/A	1. Tables, machines, and equipment are arranged to allow safe working conditions.
S	U	N/A	2. Aisles are unobstructed.
S	U	N/A	3. Surfaces are clean.
S	U	N/A	4. Exhaust fans are in good working condition.
S	U	N/A	5. Fire extinguishers are fully charged.
S	U	N/A	6. Exit doors are clear and unobstructed.

Comments: _____

B. Housekeeping

S	U	N/A	1. General appearance is neat and orderly.
S	U	N/A	2. Tools are located easily at the tool panel.
S	U	N/A	3. Tables are clean.
S	U	N/A	4. Corners are clean and clear.
S	U	N/A	5. Materials are stored in an orderly and safe condition.
S	U	N/A	6. Dangerous materials such as paints and chemicals are stored in metal cabinets.
S	U	N/A	7. An approved metal container is provided for waste and oily rags.
S	U	N/A	8. Floors are clean of oil, water, and other foreign material.
S	U	N/A	9. Floors, walls, and windows are cleaned periodically.

Comments: _____

C. Equipment

S	U	N/A	1. Machines are arranged so that students are protected from hazards of their own machines, other machines, passing students, etc.
S	U	N/A	2. Danger zones are properly indicated/or guarded.
S	U	N/A	3. Enclosure guards protect all moving belts and gears.
S	U	N/A	4. All guards for blades and belts are in use.
S	U	N/A	5. All equipment control switches are easily accessible to the student.
S	U	N/A	6. All machines and power tools can be powered off when the instructor is out of the room.
S	U	N/A	7. Machines are in safe working condition.
S	U	N/A	8. Hand tools are kept clean, their handles in good condition, and they are in safe working order.

Comments: _____

Student Safety and Health Checklist (continued)

D. Electrical

S	U	N/A	1. All switches and outlets are in good condition.
S	U	N/A	2. Emergency stop switches are located throughout the room and are easily accessible.
S	U	N/A	3. Male ends of electrical cords have their proper ground blades in place.
S	U	N/A	4. A master control switch is in use for all equipment and tools.

Comments: _____

E. Personal Protective Equipment

S	U	N/A	1. Appropriate safety glasses are provided and are in good condition.
S	U	N/A	2. Hearing protectors are available.
S	U	N/A	3. Appropriate gas welding goggles and welding helmet are available.
S	U	N/A	4. Proper wearing apparel is available for the job being done.
S	U	N/A	5. Respirators are available for dusty or toxic atmospheres such as spray painting or using toxic solvents.
S	U	N/A	6. Other students are protected from electric welding by curtains.
S	U	N/A	7. First-aid kit is adequate and easily located.
S	U	N/A	8. Eyewash station is clean and functioning properly.

Comments: _____

F. WHMIS

S	U	N/A	1. WHMIS centre is up and placed in an easily accessible location.
S	U	N/A	2. Material safety data sheets are available for every applicable item in the facility.
S	U	N/A	3. All applicable items as above are labelled.
S	U	N/A	4. Students are made aware of WHMIS and its purpose.
S	U	N/A	5. Students are tested on their WHMIS understanding.

Comments: _____

Safety Inspection Report

School: _____ Date of Inspection: _____

Facility: _____ Time of Inspection: _____

Item	Hazards Observed	Repeat Item		Recommended Action	Follow Up		
		Yes	No		Corrective Action Taken	Date Completed	Authorized Signature
Copies to: (for action)					Inspected by:		
Copies to: (for information)							

Hazardous Material Inspection

Circle the appropriate rating

				Comments
			Product Information	
Yes	No	N/A	1. Containers are labelled to meet legal requirements?	
Yes	No	N/A	2. Labels are easy to read?	
Yes	No	N/A	3. Material safety data sheets (MSDSs) are available and current?	
			Preventative Measures – Ventilation	
Yes	No	N/A	4. Ventilation adequate? (Evidence of dust, fumes, etc., may be caused by inadequate or malfunctioning ventilation.)	
			Handling Procedures and Equipment	
Yes	No	N/A	5. Handling procedures are explained thoroughly and followed?	
			Leaks and Spills	
Yes	No	N/A	6. Any evidence of leaks or spills?	
Yes	No	N/A	7. Cleaning procedures are explained thoroughly and followed?	
Yes	No	N/A	8. Waste disposal procedures are adequate and followed?	
			Storage	
Yes	No	N/A	9. Storage conditions are adequate?	
Yes	No	N/A	10. Safety containers for flammable liquids (i.e., gasoline)?	
			Personal Protective Equipment	
Yes	No	N/A	11. Personal protective equipment available and used?	
Yes	No	N/A	a) Gloves	
Yes	No	N/A	b) Eye protection	
Yes	No	N/A	c) Aprons	
Yes	No	N/A	d) Footwear	
Yes	No	N/A	e) Respirator/Dust mask	
Yes	No	N/A	f) Others	

Equipment Maintenance Log

Equipment description: _____

Serial Number: _____ **Model Number:** _____

Date:	Action Taken/Comments:	Initals

Student Assignment

General Safety Concerns in the School Environment

Purpose

To gain an understanding that everyone must play a role in safety and health education. Although it depends on the age group, safety and health should be taught in all settings, including the home, workplace, school, and/or playground.

- Garbage should not be on the floors in the hallways.
- Shoes and boots should not be scattered along the floor.
- Students should not run in the hallways.
- The smell of cleaning solutions should be kept to a minimum.
- Students should keep the area clean and neat.
- Students should exercise caution when opening doors.
- Students should exercise caution when going to and from school (bus, car, walking, bike).
- Students should exercise caution when using classroom tools and products (scissors, stapler, glue, markers, et cetera).
- Fire drills and exits should be clear and well marked.
- Students should dress appropriately (inside and outside).
- Students should wear appropriate protective equipment.

Procedure

Students create, individually or in small groups, health and safety promotional posters for the rest of the school.

Students may begin by brainstorming health and safety issues and concerns they face within their age groups in terms of injury prevention and safety in the workplace, home, and/or school.

Students design and create posters to display safety and health issues and concerns with the goal of promoting safety and health to others.

Posters can be created for various parts of the school, subjects, or activities.

Student Activity:
Lasting Effects of Incidents—Hand Injury

Purpose

Understand the impact of incidents on physical abilities.

Prompt awareness and knowledge of people who have lost fingers as a result of an incident.

Procedure

1. Your entire class has been injured on the job. You have all lost three fingers (index, middle, and ring fingers) on the hand that you write with.
2. Using masking tape, all group members must tape the three fingers of their writing hand down towards the palm to represent the injury.
3. While your fingers are taped, you and each of your groups' members attempt the following tasks using only the injured hand.
   - Drop a pencil on the floor and pick it up.
   - Write your full name and address on paper.
   - Take your shoe off and put it on.
4. Remove the tape from your hands. Discuss as a group the challenges you found doing the above tasks.
   - Remember: hands are used in most things we do every day, which makes them prone to injury.
5. As a group, create posters to help teach others about keeping fingers and hands free from injury on an off the job.

Student Assignment:
Lasting Effects of an Incident – CAD Assignment

Purpose

Understand the impact of the incident on physical abilities; promote awareness and knowledge of people restricted to wheelchairs.

Explanation

Injuries as a result of incidents can have a long-lasting effect on an individual and his/her family. Lifestyles that we take for granted can change dramatically.

There are many supports that help people in wheelchairs go about their normal routine. However, more can be done to educate people on the prevention of accidents.

Activity

In groups, students are responsible for designing a home for a young person who has been recently confined to a wheelchair as a result of a workplace injury.

Students then brainstorm ideas of how a house may have to be changed in order to make it suitable for increased comfort and accessibility.

Students may then draw the house using traditional drafting instruments or using a suitable CAD program. Floor plans and elevations should be included.

Notes

4. CHEMICAL SAFETY AND WHMIS

To The Teacher

The Chemical Safety and Workplace Hazardous Material Information System (WHMIS) Handbook is a good introduction to this field. The goal is to provide an informative introduction into chemical safety and WHMIS education.

As students enter into the field of industrial arts, so shall they enter the age of part-time jobs. Students must realize the importance of safety in using and handling chemicals they may be exposed to. As legislation requires all workers to be informed, we are therefore obligated to make our students aware of controlled products, their use, and handling.

Incorporating an Introductory WHMIS Program into your class can take as little as four classes at only 15–20 minutes per class. Even with this short amount of time, students come out with a great understanding of WHMIS.

As new students may enter your facility after your lessons on WHMIS, this booklet and assignments may allow students to progress by themselves, if need be, with little intervention by the teacher.

Chemical Safety and WHMIS

Student Handbook

Introduction

This booklet has been made to help you understand the hazards associated with working with common products in the facility. All of those products contain chemicals.

There are many products used every day in the home, school, and workplace. You or your parents have probably used cleaners, glues, insect sprays, wood finishes, and many products that make life more comfortable.

These products help us in many ways. Cleaners make our kitchens, bathrooms, and living areas safe. Floor waxes and wood finishes protect, beautify, and preserve. Insect sprays allow us to enjoy the outdoors. Although these chemicals contribute to good living, we must be aware that there are dangers in using these products.

Chemicals in Everyday Living

Millions of products made from chemicals are used every day. The hazards associated with chemicals require careful examination, whether they are used at work, school, or home. We should always ask "Are there materials in my workplace that could harm me?"

Hazardous materials don't have to harm you if you learn:

- which ones are hazardous.
- what their hazards are.
- how they can be used safely.

CAUTION

The key word when using products that may contain hazardous chemicals is CAUTION. Respect the products for what they were designed to do. Knowledge of the product and proper handling of the product will help assure its safe use.

The "Workers Right to Know" Law

Your health and safety is important. The first line of defense in maintaining good health and safe conditions in the work area is to know about the chemicals you will be exposed to.

You Have A Right To Know:

- whether chemicals that you are being asked to use could harm you.
- how to find out about possible hazards associated with chemicals.
- how to use chemicals properly so that they are safe for you to use.
- what safety steps to take in case you spill or are accidentally exposed to hazardous materials.

To help protect you, the federal government created the Workplace Hazardous Material Information System (WHMIS). The WHMIS laws educate you about safety precautions.

One of these safety precautions includes making sure that you are aware of what hazardous materials you may be using.

The Law Says That You Have A "Right to Know:"

- what hazards you face at school or on the job.
- how you can protect yourself from these hazards.

The WHMIS law establishes a standard way for all people to learn (know) about what hazards they could face in the school (or on the job), as well as how to protect themselves against any possible danger. One purpose of this standard was so that everyone would know what information to provide and how to provide it. The reason for this is to keep you safe.

WHMIS legislation provides employees, employers, and suppliers nationwide with specific vital information about hazardous materials (called controlled products in the legislation).

We Use Hazardous Materials Every Day

There are many different materials that can be hazardous if they are not used properly. You will probably find many of these hazardous materials in your home. Most of these materials will only be dangerous if they are not handled carefully and treated with respect.

Here are just a few of the many hazardous chemicals that can be found in most homes:

- oven cleaner
- laundry bleach
- fingernail polish remover
- hair spray
- insect repellent
- turpentine

What are some hazardous chemicals in your industrial arts and technology labs/facilities?

- circuit board etchant
- photographic chemicals
- screen printing ink
- solvents (paints)
- soldering paste
- wood finishes

What Makes a Material Hazardous?

A hazardous material can be defined as any material that can cause harm to you or to the environment. You must learn about these hazards for your protection.

The provincial government recommends that students complete a training program. Reading this booklet may be part of that training program.

Chemical Hazards

The word **toxic** means poison. Poison causes illness and sometimes death.

Toxicity refers to a chemical's ability to harm living things (you).

These harmful chemicals, called toxins, affect various parts of the body, such as the nervous system, the heart, the lungs, the eyes, and the skin. Chlorinated hydrocarbons, for example, are toxins known to cause damage to the liver. They are found in the solvents used for many paints and varnishes.

How Do Chemicals Get Into the Body?

There are three ways that chemicals can enter your body.

1. Inhaling (breathing): This is the main way that toxins get into the bloodstream. Many chemicals evaporate very quickly when exposed to air. An example is when you apply wood finish to your product. The liquid in the finish evaporates very rapidly. In this evaporation process, the liquid part of the wood finish turns to a vapour. These vapours are what you smell (although sometimes vapours are odourless). The vapours are also what you breathe into your lungs. Once in the lungs, the chemicals get into the bloodstream and then into all parts of the body.
2. Skin and eye contact: Toxins can enter the body through the skin or the eyes. An example of this is when toxic wood finish is wiped on. Most people do this by pouring a small amount of the wood finish onto a soft rag and wiping it on their project. If rubber gloves are not worn, a small amount of the chemical in the finish can enter the bloodstream directly through the skin.

Toxic chemicals can harm your eyes if you are not careful. Using paint thinner to clean your hands is not only dangerous to your skin if not washed thoroughly, but can also harm your eyes if you accidentally rub them. Another example would be if an aerosol can was accidentally pointed the wrong way (i.e., towards your face) and the chemical was sprayed. Always pay attention to which way the arrow points before spraying.

3. Swallowing: Contaminated substances can damage your internal organs. Forgetting to wash your hands before putting food items in your mouth can transfer tiny amounts of chemicals into your body.

Effects of Chemicals Entering the Body

1. Immediate or acute effects: These symptoms, which show up right away, can be illness, burning sensation, eye watering, et cetera.
2. Long range or chronic effects: These effects can be prolonged illness, such as cancer, or reproduction problems that take a long time to develop.

Types of Chemical Hazards

There are two types of chemical hazards that can cause serious injuries.

1. Physical hazards: The chemical is changed physically (e.g., the chemical burns or explodes). The fire or explosion can cause serious injury.
2. Health hazards: Illness or other health problems (e.g., dizziness, headache, a skin rash, and, in severe cases, nerve disorder or damage to body organs).

The products your teacher purchases for you in the school technology facility are usually no more dangerous than products used at home. The government regulates the types of products sold in stores for homeowners to use. The government feels that products, such as those sold in hardware stores and those used in the school lab/facility, are safe if the directions on the labels are followed. Sometimes people fail to read and follow directions. If you do not follow the directions on the label, these chemicals can be very dangerous.

Fumes

One important hazard is the fumes given off by some chemicals. Breathing fumes can cause severe headaches, nausea, and possibly brain damage. This is one reason it is very important to follow the directions on the label. The label will warn you of these dangers. Often, many chemicals are used in very large quantities in large factories. It is necessary for all workers to learn about chemical hazards so that they will be able to work with the chemicals safely.

Learn About the Dangers of Chemicals

Since hazardous chemicals are used in both home and in the classroom, it is important that you learn about the dangers of using chemicals. By knowing the hazards of the chemicals you work with and by practising safe work habits, you can greatly reduce the risk associated with chemicals. Two excellent sources of information are the labels on the containers and the Material Safety Data Sheet (MSDS).

How Do You Use the Chemical as Safely as Possible?

1. Read the container label (consumer and workplace).
2. Study the MSDS.

Labels usually include:

- Identity
- Hazards
- First aid following exposure
- Handling methods

Manufacturers use the product label to explain the safest way to use the product. For this reason, it is very important that you read the labels and follow the directions.

Wood Finish

Directions
Wood must be free of moisture, dirt, wax, old finishes, etc. Sand wood thoroughly, with # 120 to # 100 sandpaper, in direction of the grain. Apply with soft cloth or foam brush. Allow at least 4 hours between coats. Clean up with mineral spirits.

Caution: Keep away from heat, sparks, and open flame. Avoid prolonged contact with skin and breathing vapours. Do not take internally. Close container after use. Use only with adequate ventilation.

Keep out of the reach of children.

ACME PAINT COMPANY
99 Red Road
Wpg., MB ROE OLO
204-878-7878

These are labels found on everyday products. For example, if you went to a hardware store to pick up paint for a corner shelf, you would find such a label.

- The name of the product
- **Directions:** How it is to be used
- **Caution:** What you must do to prevent any physical health hazards
- **The manufacturer:** The name, address, and emergency phone number of the company that manufactured or imported the product

Who's Responsible?

Students' Responsibility:

1. **Labels:** Students are responsible for reading and understanding the labels used on any chemical product they use.
2. **Material Safety Data Sheet(s):** Students should know where MSDSs are located in the lab/facility and how to read them. All schools require that all chemical substances used in the classroom be listed on posters or in a binder. (More information on MSDS will follow.)
3. **Fire Extinguishers:** Students should know how to operate a fire extinguisher.
4. **Evacuation Route:** Students should know the best building evacuation route in case of a fire, explosion, or hazardous spill.
5. **Emergency Eyewash:** Students should know how to use eyewash stations prior to an emergency.

Controlled Product Symbols and their Meaning

Sometimes a special label is applied to show the kind of hazard that the chemical could cause if it was spilled or misused.

Corrosives

You often see these labels on the shipping box of an automobile battery. These batteries contain acid that can corrode surfaces, make holes in your clothing, or burn skin. Never rub your eyes if you get acid on your hands. Always wash your hands thoroughly after you have installed or serviced any battery.

Flammable

These chemicals could burn easily (i.e., gasoline).

Poison

They have immediate effects. The chemicals must not be swallowed. Even breathing the fumes from these chemicals is very dangerous. Some household cleaners display this symbol. Other examples are chlorine and cyanide.

Compressed Gas

This area covers all compressed gasses, such as those found in the gas cylinders for oxyacetylene.

Oxidizing Material

Materials that provide oxygen or similar substances and that increase the risk of fire if they come in contact with flammable or combustible materials (i.e., oxygen, bleach).

Materials Causing Other Toxic Effects

Materials that can cause long-term effects in a person repeatedly exposed to small amounts (i.e., asbestos fibres, silica).

Biohazardous

This material may cause disease, and it also contains poisonous toxins (e.g., HIV, Hepatitis from blood, Anthrax from animal carcasses).

Dangerously Reactive

This material is unstable; it undergoes vigorous chemical reactions (i.e., acetylene, nitroglycerine).

Material Safety Data Sheets (MSDS)

In the section on learning about the dangers of chemicals, it was pointed out that to find the two best sources of chemical information you should:

- look at labels and
- refer to the appropriate MSDS

Labels are certainly important, but they are not large enough to contain all the relevant information. Therefore, manufacturers have created a special MSDS for every chemical product they sell. These sheets contain quite a lot of important information, but they do no good unless:

- they are available to read.
- you understand how to read them.
- you take the time to read them.

Why Read MSDSs?

The MSDS tells you:

- What the chemical is (i.e., name, manufacturer, properties).
- Why it is hazardous (i.e., physical risks and health risks, ways to be exposed, et cetera).
- How to deal with it safely using protective equipment, emergency and first-aid procedures.

What You Should Know About Hazardous Chemicals

- Know about your products.
- Read the labels.
- Be aware of all hazardous chemicals in your workplace.
- Review the MSDS. Remember – MSDSs exist for each and every chemical product.
- Follow recommendations made by the manufacturer of the chemical or related equipment.
- Pay attention to the instructor and all demonstrations.
- Keep containers closed tightly. Be sure lids of cans or other containers are not plugged with solids that prevent them from being sealed.
- Be sure that labels are not covered over by paint, stain, et cetera, or have not been torn or removed from container.
- Food should not be in a work area where it can become contaminated and accidentally swallowed.
- Wash hands before eating or drinking.
- Do a good job of cleaning the work area, tools, or equipment that may have been exposed to hazardous chemicals.
- Wear protective clothing and equipment when appropriate.
- Dispose of all contaminated materials properly.
- Keep flammable or explosive material away from heat sources.
- Make sure work area is well ventilated. Fresh air and sometimes an auxiliary fan help to remove vapours from work areas.

Analyzing the MSDSs

The MSDS is not a standard form found in all schools and businesses, but the information contained on the different forms is consistent. Once you understand what this information is and how it is to be used, you will be able to use any form of MSDS.

Note: Manitoba requires all MSDSs to be up to date with the latest information; therefore, MSDSs can't be older than three years!

How to Read a MSDS

Section 1 **Identity:** This tells who makes the product, their address, and their emergency telephone number.

Section 2 **Hazardous Ingredients:** This section lists all the chemicals that are in the product that are considered hazardous.

Section 3 **Physical and Chemical Characteristics**

- Boiling Point
- Evaporation Rate
- Vapour Pressure
- Water Solubility
- Vapour Density
- Appearance and Odour
- Melting Point

Section 4 **Physical Hazards:** This explains how to handle possible hazards, such as flammability, fire, and explosions.

Section 5 **Health Hazards:** This section details the health hazards that could result from exposure to the substance. This section will also tell you if the chemical is believed to be a carcinogen (a substance that causes cancer).

Section 6 **Reactivity:** This section lists the substances this chemical should be kept away from to avoid potential reactions.

Section 7 **Precautions for Safe Handling and Use:** This explains what to do if the substance spills or leaks, how to clean up the spills or leaks, and how to dispose of the substance.

Section 8 **Control Measures:** This section lists what safety equipment you should wear to prevent harmful exposure.

Where Do We Get MSDSs?

At School: Manitoba requires teachers to have a MSDS for most chemical products used in the classroom. These sheets are usually in one notebook or binder for students to look at.

At Home: If you purchase a chemical product at a store, you may ask for a copy of the MSDS. However, many stores may not have them readily at hand but they can get them for you free of charge from their supplier or the manufacturer of the product.

On the Job: Some jobs require employees to use chemicals in much greater concentrations than the consumer chemicals you use at home or in the classroom. You can see that workers on the job have a special reason for knowing what chemicals they will be using. It is very important that you learn about hazardous chemical MSDSs in school. When you get on the job, you will know about your right to know what hazards you may be exposed to. The law requires that all manufacturers and non-manufacturing companies have MSDSs immediately available to employees.

Sample of Material Safety Data Sheet

Note: You can see two examples of MSDSs (including a full-size version of this one) at the end of this section.

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

PRODUCT IDENTIFIER: Sodium hydroxide, Caustic soda		PRODUCT IDENTIFICATION NUMBER (PIN): E-318	
PRODUCT USE			
MANUFACTURER'S NAME: La Bell Industries		SUPPLIER'S NAME: Omega Chemicals	
STREET ADDRESS: 10 Rue LeJour		STREET ADDRESS: p.O. Box 1989	
CITY: Montreal	PROVINCE: Quebec	CITY: Sumware	PROVINCE: Ont.
POSTAL CODE: H0N 0C0	EMERGENCY TELEPHONE NO.: (522) 555-4433	POSTAL CODE: C1H 2O1	EMERGENCY TELEPHONE NO.: (416) 555-4321

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	CAS NUMBER	LD_{50} OF INGREDIENT (Specify species & route)	LD_{50} OF INGREDIENT (Specify species)
Sodium Hydroxide	96	1310-73-2		
Sodium Carbonate (Na_2CO_3)	0.5-2.5			
Sodium Chloride (NaCl)	0.0-2.1			
Sodium Sulphate (Na_2CO_3)	0.02-0.1			
Potassium, Calcium, and Magnesium	0.1			
Sodium Dioxide (SiO_2)	0.03			
Other Metals (total)	0.01			

SECTION 3 - PHYSICAL DATA

PHYSICAL STATE: Other	ODOUR AND APPEARANCE: White/off-white odourless, hygroscopic		
VAPOUR PRESSURE (mm Hg): Not appl.	VAPOUR DENSITY (AIR = 1): Not appl.	EVAPORATION RATE: Not appl.	BOILING POINT: 1388°C
pH: Not appl.	SPECIFIC GRAVITY: 2.13	WATER SOL.: Not appl.	

SECTION 4 - FIRE AND EXPLOSION DATA

FLAMMABILITY: YES ☐ NO ☒ IF YES, UNDER WHICH CONDITIONS?

MEANS OF EXTINCTION: Although it is non-combustible, it can be hazardous in a fire and should be known for fire fighting. If it can melt and [illegible] Hot or molten material can react violently with water (spattering). It can react with aluminum to produce flammable hydrogen gas.

FLASHPOINT (ºC) AND METHOD: Not flammable	UPPER FLAMMABLE LIMIT (% BY VOLUME): Not flammable	LOWER FLAMMABLE LIMIT (%):
AUTOIGNITION TEMPERATURE (ºC): Not flammable	HAZARDOUS COMBUSTION PRODUCTS: Not fl	
EXPLOSION DATA ⇨ SENSITIVITY TO IMPACT: Not appl.	SENSITIVITY TO STATIC DISCH	

SECTION 5 - REACTIVITY DATA

CHEMICAL STABILITY: YES ☒ NO ☐ IF NO, UNDER WHICH CONDITIONS?

INCOMPATIBILITY WITH OTHER SUBSTANCES: YES ☒ NO ☐ IF SO, WHICH ONES ⇨: Strong acids, many organic leather, wool, aluminum,

REACTIVITY, AND UNDER WHAT CONDITIONS: Slowly picks up moisture and CO_2 f Sodium carbonate

HAZARDOUS DECOMPOSITION PRODUCTS: None

PRODUCT IDENTIFIER

SECTION 6 - TOXOLOGICAL PROPERTIES

ROUTE OF ENTRY: SKIN CONTACT ☒ SKIN ABSORPTION ☒ EYE CONTACT ☒ INHALATION ☐ INGESTION ☒

EFFECTS OF ACUTE EXPOSURE TO PRODUCT: Severe to any human tissue particularly skin, eyes, and respiratory tract

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT: Dust and mist can cause damage particularly to the respiratory tract

EXPOSURE LIMITS	IRRITANCY OF PRODUCT	SENSITIZATION TO PRODUCT	CARCENOGENICITY
2 mg/m³ Ceiling limit.	Causes burning sensation	Not known	Not listed
TERATOGENICITY	**REPRODUCTIVE TOXICITY**	**MUTAGENICITY**	**SYNERGISTIC PRODUCTS**
Not known	Not known	Not listed	Reacts violently when molten

SECTION 7 - PREVENTATIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES (SPECIFY)	RESPIRATOR (SPECIFY)	EYE (SPECIFY)
rubber, polyethylene	filter type	goggles, face shield
FOOTWEAR (SPECIFY) rubber boots where needed to prevent contact	**CLOTHING (SPECIFY)** rubber apron where needed to prevent contact	**OTHER (SPECIFY)** Lab coat, overalls

ENGINEERING CONTROL (SPECIFY E.G., VENTILATION, ENCLOSED PROCESS): local exhaust

LEAK AND SPILL PROCEDURE: When spilled in a dry condition, it can be promptly shoveled up for recovery or disposal. Flush surfaces with water, neutralize with diluted acid (vinegar).

WASTE DISPOSAL: Disposal must meet with local requirements. Waste must never be discharged directly into rivers or surface waters. Neutralize and dilute with much water.

HANDLING PROCEDURES AND EQUIPMENT

STORAGE REQUIREMENTS: Store in well-sealed containers, have absorbent water (running preferred) at hand

SPECIAL SHIPPING INFORMATION: This material is classified as Corrosive

SECTION 8 - FIRST AID MEASURES

SPECIFIC MEASURES

Eye Contact: Wash eyes immediately with plenty of running water for no less than 15 min. (including under the eyelids). Speed is important to avoid permanent injury. If one eye is injured, keep the injured eye at a lower level to avoid contaminating the uninjured eye.

Skin Contact: Wash contact area promptly with much water. (Dilute acetic acid vinegar, can be used to neutralize). Remove contaminated clothing under the shower. Prolong washing until medical help arrives.

Inhalation: Remove from exposure to mist or dust and get prompt medical help

Ingestion: Immediately phone 911 and ask for poison treatment. Describe the chemical that has been swallowed, and follow the advise of emergency personnel

SECTION 9 - PREPARATION DATE OF MSDS

PREPARED BY (GROUP, DEPARTMENT, ETC.)	PHONE NUMBER	DATE

What If a Spill Occurs?

There are several rules to follow in case of a spill in a classroom. Use the following common-sense guidelines.

- Don't panic. Evacuate the spill area if there is a danger of fire or explosion.
- Alert your teacher immediately.
- Check for possible physical injuries. Did the chemical get into anyone's eyes? (If this happens, it is especially important to act swiftly.) Do the following:
  - — Read the label – Does it say to flush eyes with water? If so, help the person to the sink or eyewash station and flush eyes until medical help arrives.
  - — Your instructor will usually decide whether to call for medical help.
- Alert other students of the spill. Stay away from spilled chemicals.
- The instructor will take care of the proper method of cleaning up the chemical according to the MSDS.

Safety Equipment

All students should wear safety protection when working with solvents. What is required? It may be different for each chemical you are working with.

Safety Goggles: Safety goggles should always be used. This is to prevent eye injury in case of accidental splash or other eye contact.

Skin Protection: Sometimes gloves should be worn. With some wood finishes, it may not be necessary to wear skin protection. How do you know? It will tell you on the MSDS.

Oily Waste Containers: The rags used to apply wood finishes should be placed in an oily waste container. Rags filled with solvents, oil, and other chemicals will also be placed in these safety containers. These containers should be used for disposal of material with solvents or oils only. Never use them for papers, gum wrappers or other trash which they were not meant for.

Respirators: Used to reduce the inhalation of vapours. Often worn when spray painting larger surfaces (e.g., painting automobiles).

What Dangers Must We Avoid?

Fumes: Fumes are usually invisible. As solvents and other chemicals evaporate, vapours or fumes are given off. Evaporation means going from a liquid (or solid) to a gas. In many cases, mild fumes from household cleaners may not bother you. If you are applying wood finish to a project, fumes will be given off as that finish evaporates. If you are using a non-toxic finish, the fumes cause no health hazard. However, if you are using finishes that use a mineral spirit as lacquer base, the fumes will be toxic. In a classroom where many people might be using chemical products at the same time, it is very important that there is enough ventilation. Ventilation means: to cause fresh air to circulate through a room so as to replace the foul air.

Chemical Spills: As more containers of chemicals are being used, and more people are using them, the greater the danger of a spill. Spilled chemicals can not only spoil your clothes, they can splash in your eyes and cause blindness or burn you. What should you do if a hazardous chemical substance spills? It depends on the substance. In factories where very large quantities of chemicals are used, a spill might involve hundreds or even thousands of gallons of hazardous chemicals. If a spill like this occurs, it is very important that all

the workers know what to do. Sometimes workers are trained to know how to clean up the spill themselves and sometimes they must quickly leave the building. Since most of the chemical products used in schools are the same as those used in homes, cleanup of a spilled product can often be done by students. **Read the MSDS to find out how to clean up spills!**

Remember:

- Read labels on containers.
- Know how to read the MSDS.
- Maintain a clean work area.
- Seal containers tightly.
- Follow safety rules.
- Use protective clothing and equipment.
- Prepare for a spill. Have clean-up materials handy.
- Keep first-aid equipment up-to-date and readily available.
- Ventilate your work area.
- Keep all flammables away from heat.
- Use approved and labelled containers for storing.
- Take personal protection seriously.
- Clean up spills according to recommended procedures.
- Store chemical products in designated areas.

Product Label Awareness Assignment

Name: _____

In your own home, with the aid of an adult, find a product that is used to help clean your home. Read the label and its instructions for use and fill out the following questions.

1. The product name: _____
2. The manufacturer's name _____
3. Use of the product: _____
4. Direction for use: _____

   _____
5. Safety precautions for use: _____

   _____

   _____
6. Clean-up and spill procedures: _____

   _____

   _____

   _____
7. Are there any symbols on the product (i.e., flammable, corrosive)?

   List which symbols are found on the container.

   _____

   _____

   _____

   _____

MSDS Awareness Assignment

Name: _____

Using the MSDS found in the booklet, find and write down the following:

1. The product name: _____
2. The manufacturer's name _____
3. List the ingredients found in this substance: _____

   _____

   _____

4. Does the product have any health hazard risks by the following?
   a. Inhalation health risks and symptoms of exposure: _____

      _____

   b. Skin and eye contact health risks and symptoms of exposure: _____

      _____

   c. Ingestion health risks and symptoms of exposure: _____

      _____

5. State the emergency first-aid procedures for skin contact. _____

   _____

   _____

6. State the precautions required to be taken in storing this product. _____

   _____

   _____

7. List and state the exposure control for skin protection. _____

   _____

Chemical Safety and WHMIS Test

Name: _____

1. What is meant by the law …"Right To Know"? _____

2. List three products found in your home that can contain hazardous chemicals.

3. List three products in your industrial arts and technology facility that contain hazardous chemicals.

4. List three ways chemicals can enter your body.

5. What is the full name of the abbreviation MSDS?

6. What is the full name of the abbreviation WHMIS? _____

7. State at least three responsibilities a student must know in regards to safety and WHMIS. _____

8. Determine the correct meaning of the hazard sign and place the corresponding letter after the sign.

A. Materials causing other toxic effects

B. Biohazardous

C. Corrosive

D. Flammable and combustible

E. Poisonous

F. Compressed gas

G. Oxidizing

H. Dangerously reactive

9. What are the three important things that a MSDS tells us?

   1. _____

   2. _____

   3. _____

10. What would you do if there was a chemical spill in the facility?

_____

_____

_____

_____

_____

11. List at least three pieces of safety equipment that may be required when handling chemicals.

_____

_____

_____

_____

12. Do you believe the workers "right to know" law is a good law? Why or why not? Please explain your answer.

_____

_____

_____

_____

_____

_____

_____

_____

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

PRODUCT IDENTIFIER Sodium hydroxide, Caustic soda		**PRODUCT IDENTIFICATION NUMBER (PIN)** S-318	
PRODUCT USE			
MANUFACTURER'S NAME La Bell Industries		**SUPPLIER'S NAME** Omega Chemicals	
STREET ADDRESS 18 Rue LeJour		**STREET ADDRESS** P.O. Box 1989	
CITY Montreal	**PROVINCE** Quebec	**CITY** Sumware	**PROVINCE** Ont.
POSTAL CODE M0N 0C0	**EMERGENCY TELEPHONE NO.** (522) 555-4433	**POSTAL CODE** C1H 2O1	**EMERGENCY TELEPHONE NO.** (416) 555-4321

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENTS	%	CAS NUMBER	LD_{50} OF INGREDIENT (Specify species & route)	LD_{50} OF INGREDIENT (Specify species)
Sodium Hydroxide	96	1310-73-2		
Sodium Carbonate (Na_2C0_3)	0.5-2.5			
Sodium Chloride (NaCl)	0.0-2.1			
Sodium Sulphate (Na_2CO_3)	0.02-0.1			
Potassium, Calcium, and Magnesium	0.1			
Sodium Dioxide (SiO_2)	0.03			
Other Metals (total)	0.01			

SECTION 3 - PHYSICAL DATA

PHYSICAL STATE Other	**ODOUR AND APPEARANCE** White/off-white odourless, hygroscopic			**ODOUR THRESHOLD (ppm)** odourless
VAPOUR PRESSURE (mm Hg) Not appl.	**VAPOUR DENSITY (AIR = 1)** Not appl.	**EVAPORATION RATE** Non-volatile @ room temp	**BOILING POINT (°C)** 1388ºC	**MELTING POINT (°C)** 318ºC
pH Not appl.	**SPECIFIC GRAVITY** 2.13	**COEFF. WATER/OIL DIST.** Not appl.		

SECTION 4 - FIRE AND EXPLOSION DATA

FLAMMABILITY YES ☐ NO ☒ IF YES, UNDER WHICH CONDITIONS?

MEANS OF EXTINCTION Although it is non-combustible, it can be hazardous in a fire area. The following should be known for fire fighting: 1) it can melt and flow when heated (mp 318ºC) 2) Hot or molten material can react violently with water (splattering). 3) Can react with certain metals, such as aluminum to generate flammable hydrogen gas.

FLASHPOINT (ºC) AND METHOD Not flammable	**UPPER FLAMMABLE LIMIT (% BY VOLUME)** Not flammable	**LOWER FLAMMABLE LIMIT (% BY VOLUME)** Not flammable
AUTOIGNITION TEMPERATURE (°C) Not flammable	**HAZARDOUS COMBUSTION PRODUCTS** Not flammable	
EXPLOSION DATA ⇨ SENSITIVITY TO IMPACT Not appl.	**SENSITIVITY TO STATIC DISCHARGE** Not appl.	

SECTION 5 - REACTIVITY DATA

CHEMICAL STABILITY YES ☒ NO ☐ IF NO, UNDER WHICH CONDITIONS?

INCOMPATIBILITY WITH OTHER SUBSTANCES YES ☒ NO ☐ IF SO, WHICH ONES ⇨ Strong acids, many organic compounds, leather, wool, aluminum, zinc, and tin.

REACTIVITY, AND UNDER WHAT CONDITIONS Slowly picks up moisture and CO_2 from the air to form Sodium carbonate

HAZARDOUS DECOMPOSITION PRODUCTS None

PRODUCT IDENTIFIER

SECTION 6 - TOXOLOGICAL PROPERTIES

ROUTE OF ENTRY — SKIN CONTACT ☒ SKIN ABSORPTION ☒ EYE CONTACT ☐ INHALATION ☐ INGESTION ☒

EFFECTS OF ACUTE EXPOSURE TO PRODUCT: Damage to any human tissue particularly skin, eyes, and respiratory tract.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT: Dust and mist can cause damage particularly to the respiratory tract.

EXPOSURE LIMITS	IRRITANCY OF PRODUCT	SENSITIZATION TO PRODUCT	CARCENOGENICITY
2 mg/m^3 Ceiling limit.	Causes burning sensation	Not known	Not listed
TERATOGENICITY	**REPRODUCTIVE TOXICITY**	**MUTAGENICITY**	**SYNERGISTIC PRODUCTS**
Not known	Not known	Not listed	Reacts violently when molten

SECTION 7 - PREVENTATIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES (SPECIFY)	RESPIRATOR (SPECIFY)	EYE (SPECIFY)
rubber, polyethylene	filter type	goggles, face shield
FOOTWEAR (SPECIFY) rubber boots where needed to prevent contact	**CLOTHING (SPECIFY)** rubber apron where needed to prevent contact	**OTHER (SPECIFY)** Lab coat, overalls

ENGINEERING CONTROL (SPECIFY E.G., VENTILATION, ENCLOSED PROCESS): local exhaust

LEAK AND SPILL PROCEDURE: When spilled in a dry condition, it can be promptly shovelled up for recovery or disposal. Flush surfaces with water, neutralize with diluted acid (vinegar).

WASTE DISPOSAL: Disposal must meet with local requirements. Waste must never be discharged directly into sewers or surface waters. (Neutralize and dilute with much water)

HANDLING PROCEDURES AND EQUIPMENT

STORAGE REQUIREMENTS: Store in well-sealed containers, have abundant water (running preferred) at hand.

SPECIAL SHIPPING INFORMATION: This material is classified as **Corrosive**

SECTION 8 - FIRST AID MEASURES

SPECIFIC MEASURES

Eye Contact: Wash eyes immediately with plenty of running water for no less than 15 min. (including under the eyelids). Speed is important to avoid permanent injury. If one eye is injured, keep the injured eye at a lower level to avoid contaminating the uninjured eye.

Skin Contact: Wash contact area promptly with much water. (Dilute acetic acid, vinegar, can be used to neutralize). Remove contaminated clothing under the shower. Prolong washing until medical help arrives.

Inhalation: Remove from exposure to mist or dust and get prompt medical help.

Ingestion: Immediately phone 911 and ask for poison treatment. Describe the chemical that has been swallowed, and follow the advise of emergency personnel.

SECTION 9 - PREPARATION DATE OF MSDS

PREPARED BY (GROUP, DEPARTMENT, ETC.)	PHONE NUMBER	DATE

M A T E R I A L S A F E T Y D A T A S H E E T Rev. 06B
For Coating, Resins, and Related Materials NPCA 1-84

Manufacturer's Name
BENJAMIN MOORE & CO.
51 CHESTNUT RIDGE RD
MONTVALE, NJ 07645

Emergency Telephone No.
800-424-9300 (CHEMTREC)

Date Prepared	Last Rev Date	Information Telephone No.
01-19-01	09-05-00	201-573-9600

For the most up-to-date MSDS information
please visit our website www.benjaminmoore.com/msds/go.html

SECTION I - PRODUCT ID

PRODUCT*: M07, nM07
CLASS: SOLVENT THINNED PAINT
NAME: UNIVERSAL METAL PRIMER
COLOR: ALL

** HMIS CODE **
HEALTH: 2*
FLAMMABILITY: 3
REACTIVITY: 0
PERSONAL PROT:

** SARA TITLE 312 **
ACUTE: Y CHRONIC: Y FIRE: Y PRESSURE: N REACTIVITY: N

For a complete description of HMIS and an explanation of the PERSONAL PROT: code, see Section XX.

*NOTE: In the PRODUCT code a little n can be any capital letter of the alphabet except P or Q.

SECTION II HAZARDOUS INGREDIENTS

INGREDIENT	HAZ	SARA	MAX %	CAS #	TLV	PEL	STEL	CEIL	MM Hg
n-Butyl Acetate	Y	N	5.5	000123-86-4	150 ppm	150 ppm	200 ppm	N/E	9 @ 20C
Naphthalene	Y	Y	2.2	000091-20-3	10 ppm	10 ppm	15 ppm	N/E	N/A
Ethyl Benzene	Y	Y	3.7	000100-41-4	100 ppm	100 ppm	125 ppm	N/E	10 @ 20C
Xylene	Y	Y	20.1	001330-20-7	100 ppm	100 ppm	150 ppm	N/E	21 @ 38C
Stoddard Solvent	Y	N	1.8	008052-41-3	100 ppm	100 ppm	N/E	N/E	2.0 @ 20
Silica, Crystalline	Y	N	5.8	014808-60-7	.1 mg/M3	.1 mg/M3	N/E	N/E	N/A
Iron Oxide	Y	N	6.4	001332-37-2	5 mg/M3	10 mg/M3	N/E	N/E	N/A
Zinc Phosphate	Y	Y	4.1	007779-90-0	10 mg/M3	15 mg/M3	N/E	N/E	N/A
Aluminum Phosphate	Y	N	1.9	007784-30-7	10 mg/M3	N/E	N/E	N/E	N/A

MSDS # : M07, nM07 Page 2

Talc
Y N 36.4 014807-96-6 2 mg/M3 2 mg/M3 N/E N/E N/A

Methyl Ethyl Ketoxime
Y N .2 000096-29-7 0.1 ppm N/E N/E N/E 2.0 @ 68

Methyl N-Propyl Ketone
Y N 7.8 000107-87-9 200 ppm 200 ppm 250 ppm N/E 27.8 @ 6

Titanium Dioxide
Y N 12.3 013463-67-7 10 mg/M3 10 mg/M3 N/E N/E N/A

Petroleum Distillates, n.o.s.
Y N 4.7 008002-05-9 300 ppm 300 ppm 400 ppm N/E 26 @ 100

Calcium Carbonate
Y N 25.0 000471-34-1 10 mg/M3 5 mg/M3 N/E N/E N/A

****

This product contains one or more reported carcinogens or suspected carcinogens which are noted NTP, IARC, or OSHA-Z in the other limits recommended column.

****

Note: This product contains pigments which may become a dust nuisance when removed by abrasive blasting, sanding, or grinding.
This product may contain small amounts of materials known to the State of California to cause cancer and reproductive harm.

SECTION III PHYSICAL DATA

BOIL RANGE: 255.0 to 385.0 WT/GL: 11.3 to 12.7 %VOL/VOL: 39.7 to 49.4
EVAPORATION RATE: SLOWER THAN ETHER VAPOR DENSITY: HEAVIER THAN AIR

SECTION IV FIRE AND EXPLOSION HAZARD DATA

D.O.T. FLAMMABILITY CLASS.: FLAMMABLE FLASH POINT: 72 F PMCC
LEL %: 1.0
EXTINGUISHING MEDIA: FOAM CO2 DRY CHEMICAL WATER FOG
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Toxic gases may form when product burns.
Closed containers may burst if exposed to extreme heat or fire.
SPECIAL FIRE FIGHTING PROCEDURES:
Cool exposed containers with water. Use self-contained breathing apparatus.
Do not use water stream on burning liquid. Use self-contained breathing apparatus.

SECTION V HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE - ACUTE:
Inhalation - Harmful if inhaled. May affect the brain or nervous system causing dizziness, headache or nausea.
Contact - Causes eye irritation.
Contact - Causes skin irritation.
Skin Absorption - Hazardous ingredients contained in this product have the capacity to be absorbed through the skin in sufficient quantities to cause systemic toxicity. See Safe Handling and Use Information (Section VIII).
Ingestion - Irritation of the digestive tract and nervous system depression

(drowsiness, dizziness, loss of coordination and fatigue). Aspiration Hazard - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.
EFFECTS OF OVEREXPOSURE - CHRONIC:
Contains: Crystalline Silica which has been determined to be carcinogenic to humans (1) by IARC when in respirable form. Risk of cancer depends on duration and level of inhalation exposure to dust from sanding the dried paint or spray mist.
NOTICE: Reports have associated permanent brain and nervous system damage with repeated, prolonged overexposure to solvents among persons engaged in the painting trade. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.
IARC has classified Ethyl Benzene as possibly carcinogenic for humans (2B).
MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE:
None expected when used in accordance with Safe Handling and Use Information (Section VIII).
Inhalation statement: Sanding dust inhalation may cause lung damage.
Contains Methyl Ethyl Ketoxime (MEKO) which has been identified as a potential animal liver carcinogen. Currently, MEKO is not listed as a potential carcinogen by IARC, NTP or OSHA.
PRIMARY ROUTE(S) OF ENTRY: DERMAL INHALATION INGESTION
EMERGENCY AND FIRST AID PROCEDURES :
Inhalation - Remove from hazard area, maintain breathing, call physician.
Skin Contact - Remove with soap and water.
Eye Contact - Flush immediately with large amounts of water. Call physician
Ingestion - Drink 1 or 2 glasses of water to dilute.
DO NOT induce vomiting. Call physician.

SECTION VI REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION WILL NOT OCCUR
HAZARDOUS DECOMPOSITION PRODUCTS:
Burning may produce carbon dioxide and carbon monoxide.
CONDITIONS TO AVOID: Elevated temperatures and build up of vapors
INCOMPATABILITY (MATERIALS TO AVOID): None reasonably foreseeable.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Remove all sources of ignition. Avoid breathing vapors. Use non-sparking tools to return materials to container. Absorb residue with Fullers earth.
WASTE DISPOSAL METHOD:
Conventional procedures in compliance with local, state and federal regulations. Do not incinerate sealed containers.

SECTION VIII SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION:
Wear a properly fitted vapor/particulate respirator approved by NIOSH for use with paints during application or sanding and until all vapors and spray mist are exhausted. In confined spaces or in situations where continuous spray operations are typical, or if proper respirator fit is not possible, wear a positive-pressure, supplied air respirator approved by NIOSH.
VENTILATION:
Adequate to maintain working atmosphere below T.L.V. and L.E.L.
(See Sect. II for ingredient data and concentrations). Mechanical exhaust

may be required in confined areas.
Discharge exhaust only in area away from ignition sources.
PROTECTIVE GLOVES: Solvent impermeable gloves are required.
EYE PROTECTION : Splash goggles or safety glasses with side shields.
OTHER PROTECTIVE EQUIPMENT: Clothing adequate to protect skin.
HYGIENIC PRACTICES:
Remove and wash clothing before reuse. Wash hands before eating, smoking or using the washroom.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Flammable - Keep away from heat, sparks and flames.
OTHER PRECAUTIONS :
Use only with adequate ventilation. Avoid prolonged contact with skin and breathing of vapor spray mist or sanding dust.
Close container after each use. Keep out of reach of children. Do not take internally.

SECTION XX

HMIS (Hazardous Materials Identification System)(R) NPCA
HMIS is a recognized workplace Hazard Communications System as required by OSHA (29 CFR 1910.1200). Information on establishing a compliant hazardous communication program using HMIS is available from:
American Labelmark Co., Inc., Labelmaster Division
5724 N. Pulaski Rd., Chicago, IL 60646
1-800-621-5808
The ratings assigned by Benjamin Moore & Co. are only suggested ratings; the contractor/employer has ultimate responsibility for HMIS rating where this system is used.
PERSONAL PROTECTION: This code is left blank on Benjamin Moore & Co. MSDS's as it depends on application technique and the workplace ventilation. Please read Sections II through IX of this MSDS before deciding on appropriate protective equipment and beginning work. There are codes available for this section which can be obtained from Labelmaster.
This product contains at least one toxic chemical listed in Section II that is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and 40 CFR 372.

DISCLAIMER

The information contained herein is presented in good faith and believed to be accurate as of the effective date shown above. This information is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determination of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. Any use of this data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.
NOTICE: Removal of old paint by sanding, scraping or other means may generate dust or fumes which contain lead. Exposure to lead dust or fumes may cause adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For additional information, contact the USEPA/Lead Information Hotline at 1-800-LEAD-FYI.

KEEPING YOUR FACILITIES

SAFE

APPENDIX A
SAFETY FIRST
FACILITY SAFETY SIGNS

WHMIS

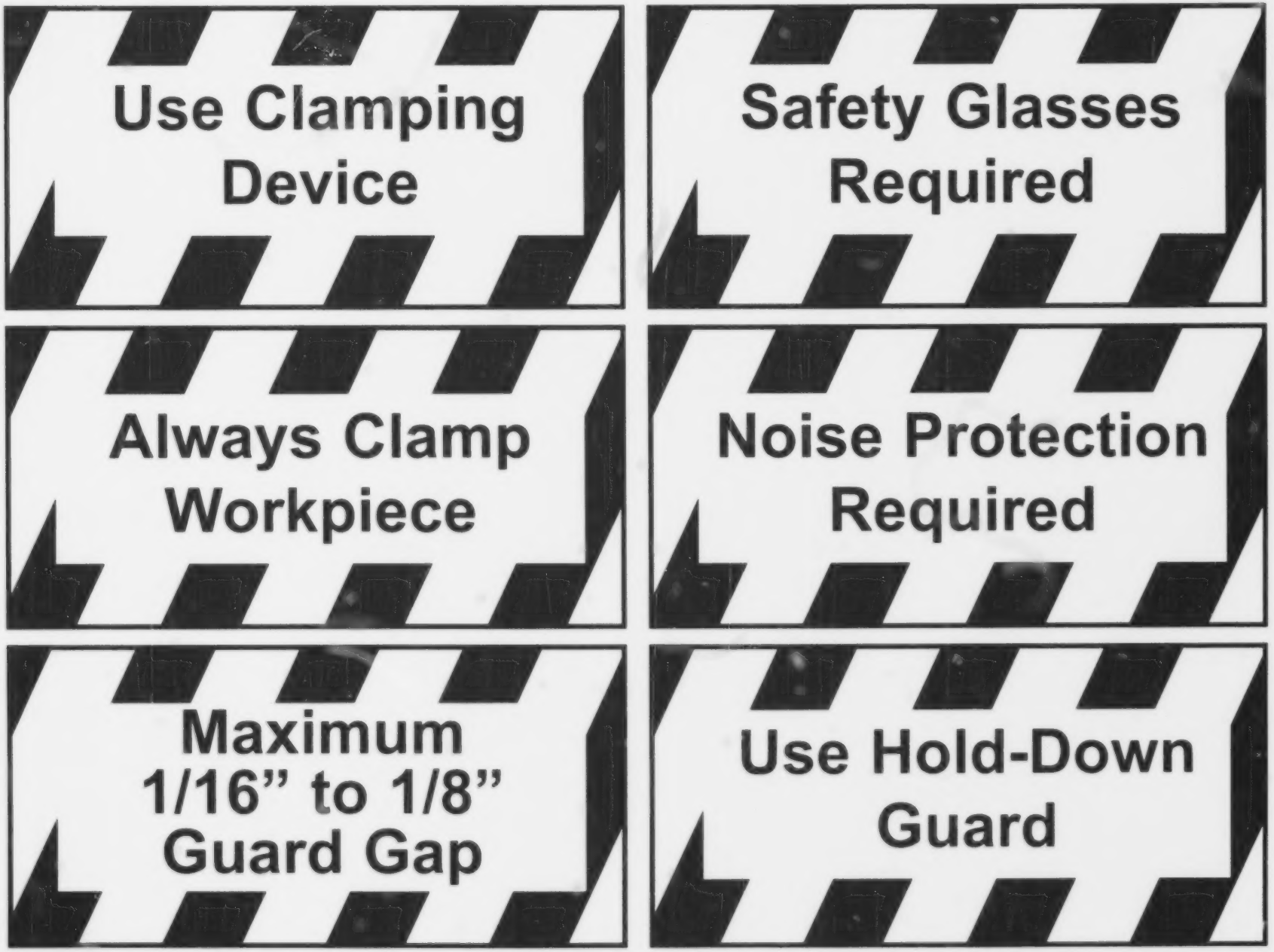
Eyewash Station

Hearing Protection

Lens Cleaning Station

Safety Glasses Required

Use Push Stick
Use Hearing Protection
Stand to Sides of Planer Mouth
Use Hold-Down Guard
Keep Fingers 5 cm from Sanding Disk
Keep Fingers 5 cm from Sanding Belt


Use Clamping Device
Safety Glasses Required
Always Clamp Workpiece
Noise Protection Required
Maximum 1/16” to 1/8” Guard Gap
Use Hold-Down Guard

Always Clamp Workpiece
Always Clamp Workpiece
Always Clamp Workpiece
Always Clamp Workpiece
Use Hold-Down Guard
Use Hold-Down Guard

Safety FIRST

FLOOR JACKS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Use on firm, flat floor or ground.
- Always use safety stands to hold up vehicle.
- Ensure that stands are placed on the vehicle frame and are set at the same height.

Safety FIRST

AIR COMPRESSOR

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Never point an air nozzle at any part of your body or at anyone.
- Always wear safety glasses when using any tools that require compressed air to operate.

Safety FIRST

HOIST

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Know how high you can safely raise a vehicle.
- Make sure vehicle is driven onto the hoist squarely.
- Lifting pads must be on the frame.
- Eye goggles must be worn when working below a vehicle.

Safety FIRST

SAFETY STANDS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Must be used on a flat ground surface.
- Must be placed on the frame, sub-frame, or vehicle suspension.

Safety FIRST

VARSOL WASH STATION

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Use with ventilation.
- Use latex gloves to protect hands.
- Wear eye protection.
- Do not use compressed air to dry a part.

Safety FIRST

TIRE (WHEEL) BALANCE MACHINE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Remove any loose stones in tread.
- Make sure tire cover safety switch is working.
- Do not lift safety cover until tire has stopped rotating.
- Ensure floor area is dry.

Safety FIRST

TIRE MACHINE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Keep floor as dry as possible to avoid slipping.
- Keep hands clear of the rim and tire when reseating the bead.

Safety FIRST

PHOTO CHEMICAL

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Avoid skin and mouth contact.
- Wash hands after using chemicals.
- Refer to MSDS binder for further information.

Safety FIRST

SCREEN PRINTING CHEMICALS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Avoid skin and mouth contact.
- Wash hands after using chemicals.
- Refer to MSDS binder for further information.

Safety FIRST

TAPE DISPENSER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Use caution when cutting the tape.

Safety FIRST

SCREEN PRINTING INK

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Avoid skin and mouth contact.
- Wash hands after using chemicals.
- Wash hands after using ink.
- Refer to MSDS binder for further information.

Safety FIRST

HEAT PRESS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Do not touch the element and the platen.

Safety FIRST

BLUEPRINT MAKING MACHINE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- **Do not look directly at the ultraviolet light.**

Safety FIRST

DARKROOM ELECTRIC EQUIPMENT

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- **Ensure hands are dry when using any electrical equipment in the darkroom.**

Safety FIRST

KNIFE, COMPASS & SCISSORS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Handle or carry with sharp end pointing towards the floor.
- Hand or pass sharp objects handle first.
- Avoid touching sharp edges.

Safety FIRST

AIRBRUSH & INK

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Avoid skin and mouth contact.
- Do not point the airbrush at anyone.
- Wash hands after using chemicals.
- Refer to MSDS binder for further information.

Safety FIRST

PAPER CUTTER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Keep hands out of cutting path.
- On shear style handle, leave in down position when finished.

Safety FIRST

UV EXPOSURE UNIT

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- If the UV light is visible, do not look at it.

Safety FIRST

WASH SINK

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Never point the nozzle at anyone.
- If the floor around the wash sink becomes wet, it should be mopped immediately.

Safety FIRST

STATIONARY GRINDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Do not wear gloves.

Safety FIRST

SQUARING SHEAR

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Keep fingers and feet away from moving parts.

Safety FIRST

DRILL PRESS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Always clamp material.
- Remove chuck key from chuck.

Safety FIRST

ETCHANT TANK FERRIC CHLORIDE/ AMMONIA PERSULPHATE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Wear proper safety gear to avoid skin contact (e.g., gloves, apron).
- Refer to "Ferric Chloride" or "Ammonia Persulphate" in MSDS binder for further information.

Safety FIRST

JOINTER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Make all adjustments with the power off.
- Joint faces and edges only.
- Do not joint wood less than 12" long.
- Use a hold-down push block for jointing surfaces.

Safety FIRST

WOOD LATHE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Check that wood is secure before starting.
- Position the tool rest to within 3 mm (1/8") of the wood.
- Remove the entire tool rest assembly before sanding.

Safety FIRST

ROUTER TABLE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Use a router bit guard whenever possible.
- Feed the material in the correct direction.

Safety FIRST

THICKNESS PLANER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Do not plane wood less than 12" long.
- If wood gets stuck, turn off power then lower the table.
- Check wood for loose knots and foreign materials before planing.

Safety FIRST

BAND SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Lower the guard to within 3 mm (1/8") of the wood.
- Keep hands 5 cm (2") away from the cut line.
- Cut slowly without forcing the material.

Safety FIRST

COMPOUND MITRE SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Secure wood against fence.
- Allow the saw blade to reach maximum speed before it contacts the wood.
- Keep hands a safe distance from the blade (15 cm [6"] away).

Safety FIRST

RADIAL ARM SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Secure wood against the fence.
- Pull saw forward with a controlled speed.
- Keep hands 12" away from the blade.

Safety FIRST

TABLE SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Always use a fence or mitre guide.
- Never stand directly in line with the saw blade.

Safety FIRST

SCROLL SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Ensure that the pressure foot is resting on the wood.
- Cut slowly, guiding the wood gently with thumbs and fingers.
- Keep hands a safe distance from the blade—never directly in front.

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Safety FIRST

SHAPER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with guards in place.
- Feed wood against the rotation of the cutters.

Safety FIRST

SPINDLE SANDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Feed wood in the direction opposite to the direction that the spindle turns.
- Use the smallest table insert that can surround the spindle.
- Press wood lightly against the spindle.
- Keep wood tight against the tabletop.

Safety FIRST

DRILL PRESS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Tightly secure all materials to the table when drilling.
- Never drill metals without proper clamps.
- Adjust table height and make depth adjustments before power is turned on.

Safety FIRST

COMBINATION BELT/DISC SANDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Hold wood flat against the tabletop.
- Press wood lightly against the belt/disk.
- Call the teacher if the belt is not tracking straight.

Safety FIRST

MORTISING MACHINE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Keep a slight gap between the hollow chisel and the bit to avoid overheating.
- Tightly secure wood to the tabletop.
- Make all table and depth adjustments with the power off.

Safety FIRST

BENCH GRINDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with shield in place.
- Keep the tool rest within 3mm (1/8") of the grindstone.
- Do not grind against the side of the stone.

Safety FIRST

HORIZONTAL BAND SAW

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.

Safety FIRST

BUFFING WHEEL (FELT, WIRE)

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Operate only with shield in place.
- Apply work only to the lower part of the wheel.
- Do not wear gloves.

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Safety FIRST

HAND TOOLS

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Only use hand tools for the job they were designed to do.
- Never use cheater bars, handles, or pipes to gain additional leverage.

Safety FIRST

CRUCIBLE FURNACE/ ENAMELING FURNACE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn (e.g., face shield).
- Wear proper safety gear (e.g., apron, gloves).
- Remove jewelry, eliminate loose clothing, and confine long hair.
- ONLY the instructor pours molten metal.

Safety FIRST

ARC WELDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn (e.g., helmet).
- Wear proper safety gear (e.g., gloves, apron).
- Remove jewelry, confine long hair.
- No nylon or loose clothing.
- Make sure area is well ventilated.

Safety FIRST

SAND BLASTER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.

Safety FIRST

BAR FOLDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Do not exceed capacity of machine.

Safety FIRST

SLIP ROLL

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Do not exceed capacity of machine.

Safety FIRST

BOX AND PAN BRAKE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Do not exceed capacity of machine.
- Keep machine in either open or closed position.

Safety FIRST

SQUARING SHEER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Do not exceed capacity of machine.

Safety FIRST

SPOT WELDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn (e.g., face shield).
- Wear proper safety gear (e.g., gloves, apron).
- Remove jewelry, eliminate loose clothing, and confine long hair.

Safety FIRST

OXYGEN ACETYLENE OUTFIT

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn (e.g., goggles with a #5 lens).
- Wear proper safety gear (e.g., gloves, apron).
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Make sure area is well ventilated.
- Do not exceed 15 psi on acetylene regulator.

Safety FIRST

MIG WELDER

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

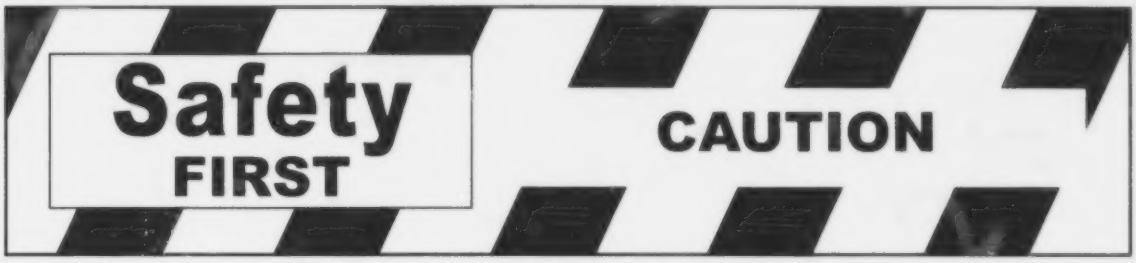
- Eye protection must be worn (e.g., welding helmet).
- Wear proper safety gear (e.g., gloves, apron).
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Make sure area is well ventilated.

Safety FIRST

METAL LATHE

Operate only with teacher's permission, and only after operation & safety procedures have been demonstrated.

- Eye protection must be worn.
- Remove jewelry, eliminate loose clothing, and confine long hair.
- Remove chuck key from chuck.
- Start at low speed.
- Ensure work is securely in the chuck or between centres before starting.



HOT METAL AREAS

- Keep floors free of debris.
- Clean up messes/spills immediately.
- Use "floor-dry"/absorb-all" for oil-based spills.
- Use plenty of water for acid spills.
- Refer to MSDS binder for further information regarding spills/clean-ups.

KEEPING YOUR FACILITIES

SAFE

APPENDIX B
WEBSITES

WEBSITES

Health and Safety Issues

Canadian Centre for Occupational Health and Safety
Safety and health directory topics: emergencies, ergonomics, fire safety, hazards, et cetera
www.ccohs.ca

Manitoba Workplace Safety and Health
Workers' safety and the right to know
www.gov.mb.ca/labour/safety

Health Canada
Workplace Health and Public Safety Programme
www.hc-sc.gc.ca/hecs-sesc/whpsp/index.htm

Hearing Conservation

University of Toronto
Noise Control and Hearing Conservation Program, definitions, et cetera
www.utoronto.ca/safety/noise2.htm

Risk and Safe Choices
Smart Risk Foundation Smart risks and choices
www.smartrisk.ca

Statistics

Angus Reid Poll
Youth attitudes towards safety and health
www.angusreid.com

WHMIS, MSDS, Consumer Products

Hazardous Material Information Review Commission
WHMIS information
www.hmirc-ccrmd.gc.ca/

Material Safety Data Sheets
Website for MSDS sheets
http://216.64.207.245manflinksc.htm

Material Safety Data Sheets
Links for MSDS info
www.msdsprovider.net

Youth Programs

British Columbia Workers' Compensation Board
Info on B.C.'s student workplace program
www.web.bc.ca/

National Institute for Occupational Safety and Health
Promoting safe work for young workers, facts about young workers
www.cdc.gov/niosh/gg-141.htm

Ontario Young Workers Awareness Program
Types of hazards, laws, rights, and responsibilities, WHMIS, top-5 causes of injury to young workers
www.youngworker.ca/

KEEPING YOUR FACILITIES

SAFE

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